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A Periodical Devoted to the Manufacture and Use of Composition Products

JULY, 1928

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Molded Products

See Page 395

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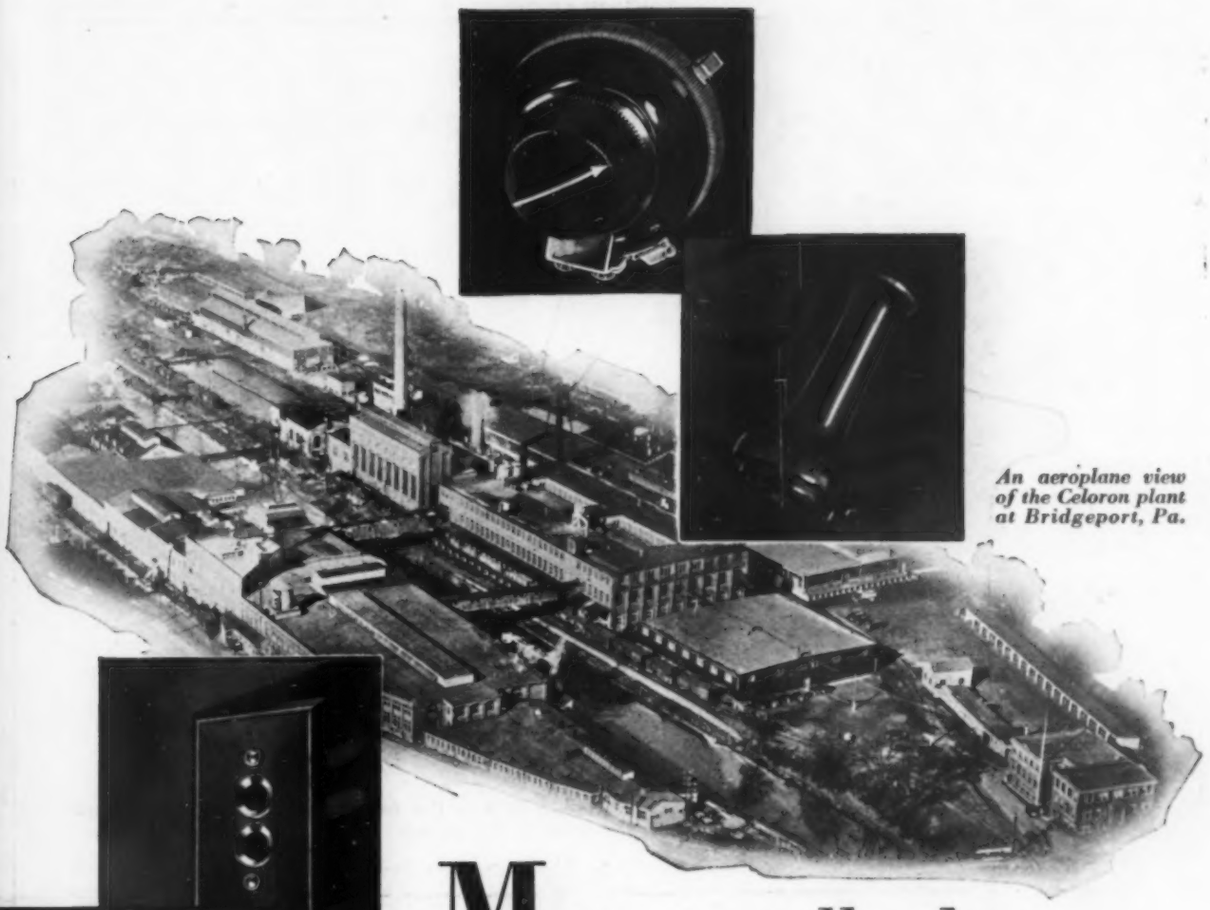

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PLASTICS & MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 JULY, 1928 No. 7

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Carl Marx, B. Ch., Editor
J. A. Maguire, Editor Molded Products
William Gruen, E. E., A. M., Associate Editor V. C. Rockhill, Consulting Editor
A. C. Blackall, British Correspondent Heinrich Prehn, German Correspondent
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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 JULY 1928 No. 7

The Historic Background of the Comb

Even our antediluvian ancestors preferred artistically wrought combs when arranging their hirsute adornment

By Heinz Kronberger

Nuremberg, Germany

AS far as the human race can look back into the dim past of its origin, it appears certain that mankind was in possession of some form of comb. While, obviously, the "prehistoric" comb was quite a different object from the beautiful creations of the modern fabricator of toilet-ware. it nevertheless laid down the general lines upon which every comb, simple or ornate, is based even to this day. As our ancient ancestors had to content themselves with the most primitive tools, the individual teeth of the combs of antiquity are usually quite far apart, and not very evenly spaced. Some of the combs that have fortunately been preserved and have come down to us from the excavations of the archeologists, are not much more efficient for their purpose than the human hand, as far as dressing or parting the hair is concerned.

Early Use of Wood and Bone

In the recently unearthed remains of the various prehistoric people, combs made of wood as well as bone have been found. Some of these undoubtedly reach back to the stone age. Most of these are rather high as compared to their breadth, and,

Curious Combs from Foreign Lands.
1. Comb from Fiji Islands.
2. Chinese reed comb.
3. Chinese wood comb.
4. Indian wood comb.

where they were intended to be seized by the hand, were partly rounded off. Whatever decoration there might have been on them, consisted usually merely of a few concentric circles, some zig-zag lines and similar simple designs.

It is thus quite evident that even the oldest of the human race already were sufficiently self-conscious to lay some stress upon their personal appearance, and that of their hair. As civilization advanced, this care became much accentuated. Both the Egyptians, as well as the Babylonians and Assyrians were rather fussy about their hair, and undoubtedly had their barber shops, much as we have them today. There is plain evidence of this, as hardly a tomb is unearthed but there are found many fine examples of the ancient comb-makers art. The comb changed its general shape, so as to be more suitable for special purposes, and the increased number of the teeth, as well as the greater regularity of the spacing, and general workmanship shows that comb-making had evidently risen to a distinctive art.

Artistic Merit

It would lead us too far afield to go minutely into the evolution of the comb during the various ages. However, during the Middle Ages, apparently a great deal of stress was laid upon combs of ornate design and costliness. During this period, remarkably fine combs, artistically wrought of ivory, and richly carved, were produced. Some of these combs were works of art, and had carved upon them the most intricate tracery, as well as small figures

that represented events of historical or artistic importance. Such combs were plentiful durin the 10th to 16th Centuries.

The highly artistic nature of the combs that have come down to us from the days of the second millenium after Christ, makes it appear probable that many of them were used more for ornamental wear than for actual tonsorial purposes. The common people probably never could acquire such masterpieces, and they were restricted to the aristocracy and the courts.

Free-hand Methods

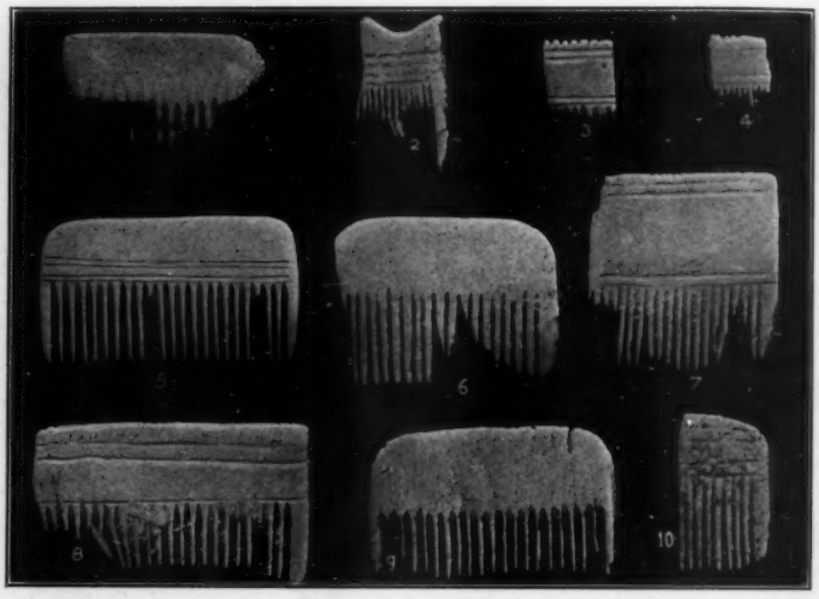
The making of these combs, was, however, a difficult and most painstaking job. The horn comb, which became popular about this time, caused the greatest difficulty, and it was then that the foundation of fabricating our modern molded combs was laid. Up to the beginning of the 18th Century all the teeth of the comb were cut by a hand saw, free hand. A special type of saw was used, so that the teeth might be evenly spaced. This tool had two saw-blades side by side. While the first cut was being made, the second blade marked out the position of the next cut, cutting down to about one half of the depth. The first saw-blade was then fitted into the pre-cut slot, and the same cut to the finish, thus marking off a third cut, and so on. It was essential that the entire space be cut without stopping, and that the blade had to run straight and true, as otherwise the comb would not be perfect. A great deal of personal skill was therefore required of the comb-cutter.

The use of machinery, at that period, was still unheard of, and any suggestions for the use of such mechanical devices was not only frowned upon, but considered entirely impossible.

As late as 1864, the publisher of a Handbook for Comb-Makers only mentions teeth-cutting machines very incidentally. He said "Side, back and curling combs are nowadays frequently cut on a machine, which of course does the job much faster, but it should be remembered that such machine-made combs do not have the high degree of durability as the carefully handmade comb." I wonder what the writer of this statement would say if he were permitted to see the remarkable mechanical development that has taken place in comb making since his day.

ber changed the whole trend of manufacture, although the horn comb is still holding its own against the almost overwhelming competition of the new materials.

The manufacture of the horn comb presents the greatest number of operations, as the plastic materials can be blanked out and made ready for the various operations with much less difficulty. The manufacture of horn



Early Egyptian Wooden Combs, from 2,500 to 3,000 years old.

At the present time, the most complicated and finest combs are made in enormous quantities by purely mechanical and mostly automatic methods.

In Europe, the development of practical comb-making machinery lay almost exclusively in the hands of one concern, namely the firm of Fritz Claussner, of Nuremberg-Doos, in Germany. It was this firm that introduced the first practical automatic tooth-cutting machine. Later the other labor-saving machinery, that now forms the basis of commercial comb manufacture, was developed and introduced.

The advent of the modern plastic materials, such as the pyroxylin plastics, artificial horn (casein solids), and hard rubcombs was described in most minute detail in PLASTICS during the years 1925 and 1926 (1925, Vol. 1, pp. 23, 96; 1926, Vol. 2, pp. 53, 166, 228).

(The author of this article also described the production of the horn comb in detail, but this has already been covered in our pages).

A Review of 1928 Synthetic Resin Patents Is Scheduled for Appearance in the August Issue

Elasticity and Mechanical Properties of Resinoids as a Function of Their Preparation

How the strength of these materials varies in different portions of a single block or rod

By O. Manfred and J. Obrist

A Communication from the German Technical High School at Brünn, Czechoslovakia

This article is from the German periodical "Kolloid Zeitschrift", in which it appeared in 1927.

The authors here present some interesting proofs of their theory as to the effect of mechanical working on the physical properties of Plastics.

The cellulose plastics will be taken up in an article starting in the August issue.

HAVING previously taken up certain of the mechanical properties of the resinoids, there will now be discussed in considerable detail the elasticity and strength of some of the actually manufactured modern phenolic as well as urea-formaldehyde plastics—the pheno-plastics and aminoplastics as we have come to term them.

Lack of Material for Comprehensive Tests

The lack of cooperation on the part of manufacturers of some of the plastic materials, and the consequent difficulty in obtaining adequate and representative samples limited the present investigation to relatively a few of the products available on the European market. The Bakelite referred to in the tables is the German product, the other phenoplastics being of European origin as well. Pollopas is made in Austria and in England. In order to expedite the investigation, only two of the more important mechanical properties of the materials were investigated, namely the Modulus of Elasticity (hereinafter abbreviated E) and the maximum bending stress, (abbreviated S^{max}). The data was obtained as the result of work carried out at the strength-testing laboratory of the German Technical High School at Brünn according to standard methods and the figures quoted represent the average of from 15 to 20 individual determinations. The following pheno-plastics were examined: *Bakelite, Juvelith, Dekorit, Vigorit, Ambrasit* and the aminoplastic *Pollopas*. All of the plastics except the *Bakelite* were available in the form of rods, plates and blocks. This should be mentioned as the plates, by reason of the internal stresses set up during the indurating operation, often show quite different qualities from the rods. In the subjoined table, the dashes show that no rods or plates of the particular material were available, or were of such configuration that a reliable and characteristic test could not be made on the same. (See p. 372).

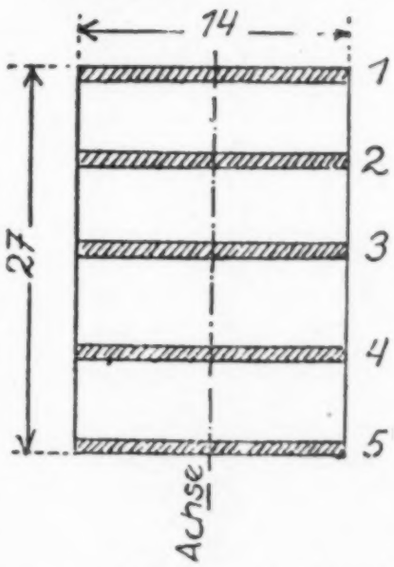


Fig. 1. Showing places from which plates for elasticity test were cut.

This tabulation shows, firstly, that, as far as rods are concerned, the aminoplastics showed the greater strength. In fact, as far as both of the constants are concerned, the rods usually show a better value than the plates. This can be explained as being caused by the effects of streaming of the particles during the production of the rods, this being especially well brought out by the *Juvelith* and *Pollopas* samples[1].

As in all of the samples tested the rods had been made by casting, and as these rods had, after setting, not been subjected to any mechanical operations, it is safe to assume that the differences in the data obtained can

1. As to whether a "high" or "low" modulus of elasticity is to be considered as "favorable" depends entirely upon the purpose to which the material is to be used. In case of the so-called plastic materials (meaning in this sense a substance such as caoutchouc) a rather incomplete elasticity is rather to be desired. It is an oft recurring error to consider caoutchouc as a sort of prototype of a highly elastic body. A very interesting and instructive article on this theme is that of A. Schob in the Gummi Zeitung, 1925-26, Vol. 40, I, p. 624; who explains some of the false beliefs, such as the one that greater change in form is synonymous with greater elasticity.

be ascribed to the degree of dispersion and aggregation of the material. This, of course, is also dependent upon the choice of the raw material and the type of catalyst employed in its condensation and aggregation.

As far as the plates are concerned, the data obtained does not permit of drawing any definite conclusions. However, the *Bakelite* and *Juvelith* samples seem to be somewhat superior, especially as to the E and S^{max} values. This may have been caused by the use of added plasticizers, and in the case of the Bakelite also by the homogeneity induced by the hardening under heat and pressure[2].

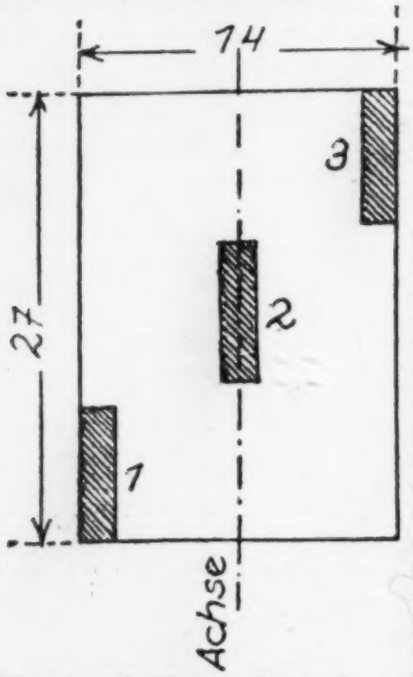


Fig. 2. Showing position where samples were removed to show difference between longitudinal and transverse positions of a block of Bakelite.

The considerable difference between the values found for the plates and rods of *Pollopas*, which material seems to have the made the poorest showing as to the modulus of elasticity, are probably caused by the different methods employed in making a rod and a plate. The hardening of the phenoplastics usually is accomplished in prismatic or conically shaped forms, whereupon the plates are cut from the blocks thus produced. In the case of Ripper's *Pollopas*, however, the material that forms the plates is cast in forms lined with porous material coated with a membrane that, while preventing the passage of the colloidal material, nevertheless permits the water to pass through. In the case of cast rods, the relatively long way that the semifluid material has to traverse leads to a better orientation of the colloid particles, while in the case of plates this condition is practically nonexistant. It may therefore be expected that the properties of plates cut from a block of this material would differ according to the point from which the plates have been cut, and that the most satisfactory qualities will be found somewhere near the center of the block where the orientation has had the greatest opportunity of occurring without outside disturbance.

This expected "streaming effect" was actually experimentally demonstrated. In order to obtain a general idea of the way the elastic properties were distributed in a block of material the same, a block of *Bakelite*, was cut parallel with its axis. The block was about 40 centimeters in height and the plate cut was about 3mm. in thickness. The strip thus obtained was then cut into four separate parts and the same tested for E and S^{max}. The following results were obtained. (See Table 2 below).

Table 1

Material	Shape	E kg/sq. cm.	S^{max} kg/sq. cm.
Bakelite	Plates	27,500	260
	Rods	32,000	400
Juvelith	Plates	36,000	200
	Rods	.....	.....
Dekorit	Plates	29,000	375
	Rods	.....	.....
Vigorit	Plates	32,000	150
	Rods	34,000	.....
Ambrasit	Plates	.....	150
	Rods	31,000	850
Pollopas	Plates	38,000	600

Even these preliminary figures showed a great diversity in the material taken from various portions of the block, the most advantageous data being obtained from a piece near the middle. As the differences were numerically much more marked with the S^{max} value, this property was determined in the further experiments.

Differences

Of three *Juvelith* blocks having an original height of 27cm., 29 cm., and 26 cm., and of which the first two had been colored with coal-tar dyes while the latter was colored with mineral matter, 14 cm., sections were cut parallel to the axis of the block. From the three 14 cm. sections thus made five transverse strips 5 mm. in thickness were cut, these smaller pieces having been chosen from

(*Continued on page 384*)

Table 2

	E	S^{max}
1st quarter:	28,000 kg/sq.cm.	150 kg/sq.cm.
2nd quarter:	27,000	260
3rd quarter:	27,000	380
4th quarter:	27,500	260

2. Cf. the fundamental ideas disclosed in the use of plasticizers in the Baekeland patents. As regards Dekorit, we do not have definite information as according to Dr. F. Rashing this substance is made by a secret process.

3. Cf. British Patent 248726. Also Baekeland U. S. Patent 1401953 and 1493056; Ellis (Synthetic Resins) p. 122, 126, 380; M. Bottler, Ueber Herstellung und Eigenschaften von Kunstharzen, (J. F. Lehmann, Munich) p. 37, (1919). Also German Patent 233803 and Ellis loc. cit. 118.

The Patent History of the Fiber Gear

The development of the art during the past five years in the United States

By Joseph Rossman,
LL.B., B. S. in Chem. Eng., M. P. L.

CONTINUING the chronological review of the fiber gear patents from the June issue, we now come to patent number:—

29. Frederick 1,456,884. May 29, 1923

A method of making composite gears that comprises forming strands of paper, weaving the strands to form sheets of suitable dimensions, impregnating the sheets with a phenolic condensation product, stacking them to form a body of suitable depth, subjecting the body to heat and pressure to compact the material and to harden the binder and cutting teeth in the periphery of the composite plate thus formed.

30. Kinney 1,466,236. Aug. 28, 1923

A gear wheel comprising a metallic hub and a working body portion of superimposed layers of fibrous sheet material and a heat-hardened binder of Bakelite molded upon the hub, the working body projecting at one side beyond the end of the hub and having an integral annular thrust shoulder engaging against such end of the hub.

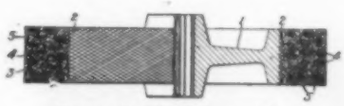
31. Bastian 1,472,147. Oct. 30, 1923

A gear comprising a working body portion of substantially 5% to 25% cork and 95% to 75% shredded duck both associated with and hardened by a cured phenolic condensation product as a binder.

32. Johnston 1,482,847. Feb. 5, 1924

A gear blank comprising sponge impregnated with a phenolic condensation product, the same being subjected to great pressure under influence of heat such as will convert the phenolic product into a solid.

The present article completes the review of the resinoid gears. The article began in the May issue of Plastics and was preceded by a general survey of the subject, followed by a digest of the patents.



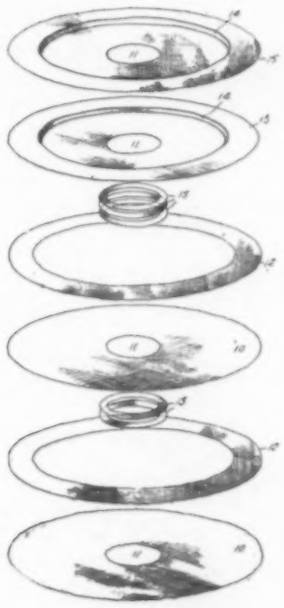
Gear described in the Bastian patent, No. 1,472,127

33. Talley 1,482,145. April 29, 1924

The method of making a composite article which comprises forming a ring of superposed layers of fibrous sheet material having its outer body portion treated with a phenolic condensation product, consolidating the treated portion by the application of heat and pressure and clamping the untreated portion under pressure between the flanges of a hub. The patent was reissued as patent No. 16,161 Sept. 8, 1925.

34. Guay 1,501,026. July 8, 1924

The method of making blanks of the character described which comprises treating textile material with a binder, cutting the material into disks, hub and rim washers, the former being smaller than the latter, forming insets in a pair of said disks, assembling the disks and washers into a stack having a common axis with an inset disk at the bottom and another at the top to form the side faces of the finished blank, and subjecting the stack thus formed to pressure to compress said material and to heat to cause the binder to harden and retain the material in a compressed state giving a blank having a thickened rim and hub and a relatively thin web.

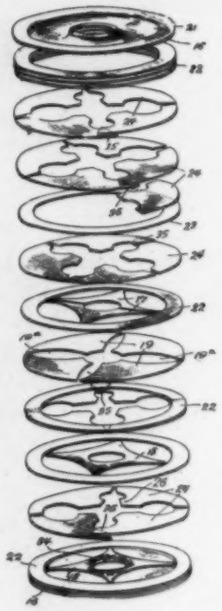


Exploded view of gear shown in Guay patent No. 1,501,026

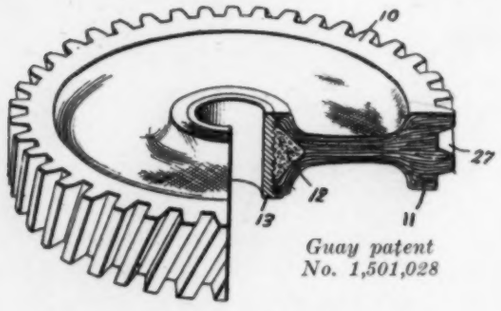
35. Guay 1,501,027. July 8, 1924

The method of making blanks of the character described which comprises cutting disks from a sheet of textile material in such manner that trimmings in the form of pointed pieces remain after the cutting operation. cutting out the centers of the

disks to form sectors, cutting certain of the pointed pieces to form segments, assembling the sectors and segments by layers in interlocking arrangement with the washers, there being spaces between adjacent sectors and segments in each layer, assembling the pointed pieces by layers inside of the washers with their points approximately registering with said space and their base portions overlapping some portion of the sectors and segments, and subjecting the material to compression and retaining it in that condition.



Guay patent No. 1,501,027



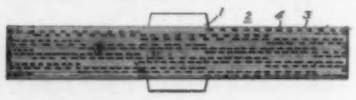
Guay patent No. 1,501,028

36. Guay 1,501,028. July 8, 1924.

A gear blank comprising a metallic hub interspersed disks and rings made of textile material which form the web and rim respectively, said rings being composed of segmental pieces the inner and outer edges of which have the same radius of curvature, and a filling piece which closely surrounds the metallic hub, is situated between certain of the disks and is composed of small pieces of textile material pressed into the form of a washer which is thickest at its bore and tapers outwardly, and a binder for holding all of said material in a compressed state.

37. Bastian 1,504, 596. Aug. 12, 1924.

A gear wheel comprising a working body portion of superimposed layers of sheet material associated with a phenolic condensation product, the several



Bastian's gear according to his patent No. 1,504,596

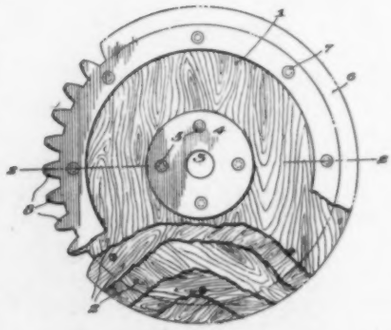
layers comprising a plurality of assembled segments, certain of the segments being of duck and certain of them of cork, the segments being so arranged that each cork segment is entirely surrounded by duck segments.

38. Hough 1,506,239. Aug. 26, 1924.

A gear made of sheets of thin parchmentized paper impregnated with a mineral oil material including petrolatum united together under high pressure.

39. Moore 1,512,560. Oct. 21, 1924.

A gear wheel comprising thin layers of wood said layers being held together by waterproof elastic cement, such as celluloid, rubber or Bakelite, said layers having the pores thereof saturated with said cement, and said layers being reduced by compression until the fibers thereof have been compressed beyond their elastic compressive strength and until the number of fibres per unit thickness has increased and without compressing the fibres to a pulp and without reducing the strength of the fibres materially.



Moore's gear Patent No. 1,512,560

40. Kempton 1,524,555. Jan. 27, 1925.

A gear wheel comprising a metal center, a metal web concentric therewith, molded material there between, and a molded working face on said web.

41. Guay 1,527,642. Feb. 24, 1925.

The method of manufacturing gear blanks which comprises cutting a relatively narrow strip of textile material which has been treated with a binder into short pieces of similar shape, stitching the pieces together to form a ribbon, winding the ribbon edgewise on a former to form a helix, transferring the helix from the former to its permanent support, and finally subjecting the ribbon to heat and pressure to consolidate the mass and confine it in its compressed state on the support.

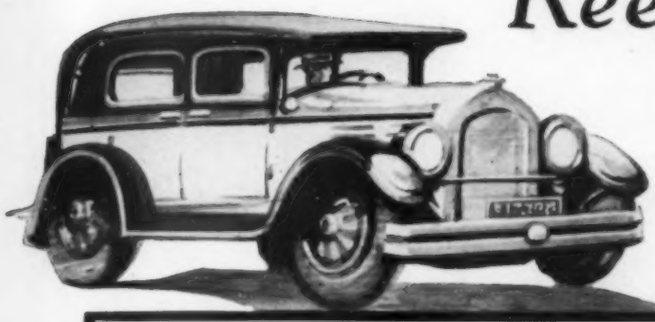
42. McIntosh 1,557,302. Oct. 13, 1925.

The method which consists in mounting between two bodies of sheet fabric a mass of irregularly placed pieces of fabric impregnated with a phenolic condensation product in its intermediate form; and thereafter subjecting said mass to heat and pressure to form a mechanical element in which the condensation product is in its final form.

Patents 43 to 60, completing the digest will appear in the August issue.

Similar review articles are in preparation. Comments from our readers as to their reactions to this type of service is requested.

Keeping Pace with Industry.



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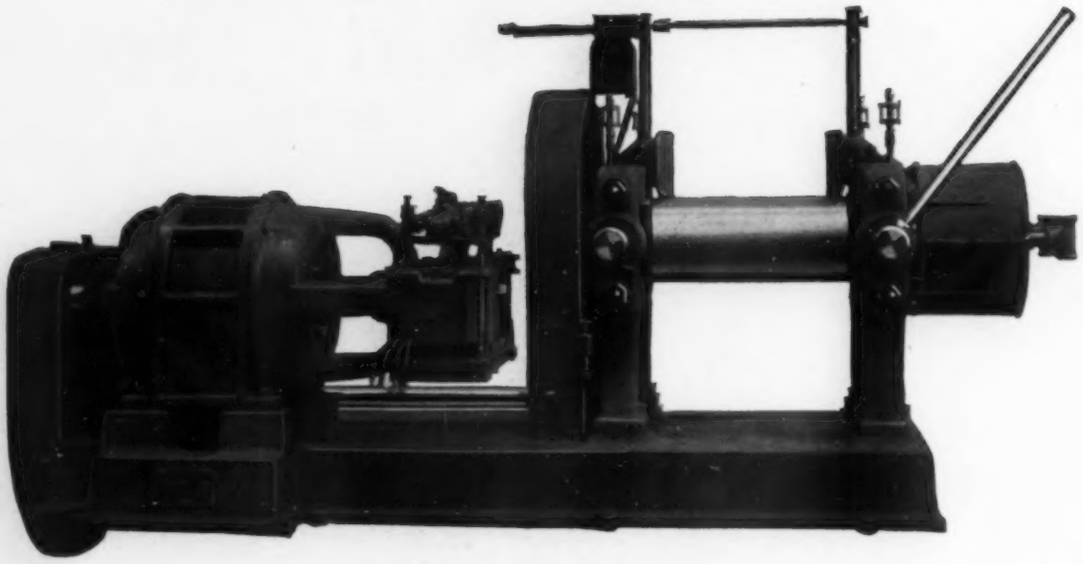

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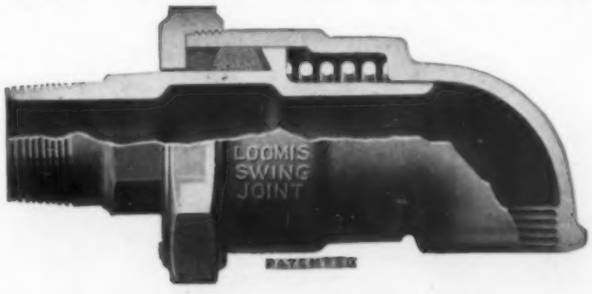

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The World's Trade In Plastics

AUSTRIA: Pyroxylin products and synthetic resins; manufacture of novelties and smoker's articles

By C. C. Concannon

Chief, Chemical Division, U. S. Bureau of Foreign and Domestic Commerce

In continuation of our publication of these official governmental figures we hope to supply information, as to the export and import possibilities in the industries most closely allied with the plastic materials.

The article on Austria was compiled by assistant Trade Commissioner, John A. Embry, stationed at Vienna, in Austria.

PYROXYLIN plastics are not manufactured in Austria at the present time (1927). A Government owned munitions factory in the suburbs of Vienna (Pulverfabrik Blumau) was converted during 1925 into a plant for the manufacture of pyroxylin plastics, but actual production never took place and the Austrian Government is now offering the machinery in this factory for sale to one of the neighboring states.

Pyroxylin

Pyroxylin plastics are listed in Austrian foreign trade statistics under the general heading of celluloid (raw, in blocks, sheets, and rods).

The following table shows the importation of plastics into Austria during the past three years:

Year	Quantity	Value
	Metric tons	
1923	338	$274,200
1924	263	273,400
1925	164	200,857

Germany supplies upward of 90 per cent of all the pyroxylin imported into Austria. The remainder is supplied by England, France, Czechoslovakia, and Switzerland. Of the 164 metric tons of pyroxylin imported into Austria last year 57 metric tons were re-exported, principally to Poland, Rumania, and Czechoslovakia, leaving Austria's domestic consumption at 107 metric tons. The current wholesale price of pyroxylin in blocks or sheets is $0.50 to $0.90 per pound, according to quality and color.

The pyroxylin consumed by Austria is used principally in the manufacture of combs, toilet articles, and a wide variety of novelties. The two important importers of pyroxylin are the Vienna branches of the Leipzig Celluloid works and the Rheinische Celluloid works of Germany. These firms sell direct to local consumers from stock. All of the consumers of pyroxylin in Austria are small fabricators who work on a hand-to-mouth basis and are unable, because of lack of capital, to import pyroxylin on their own account. The finished products of these factories consuming pyroxylin are sold chiefly in Austria and the neighboring states which formerly were an integral part of the Austro-Hungarian Empire. Their export business is greatly restricted by customs barriers and the difficulty of securing payment for their goods shipped into the Succession States. One reputable manufacturer claims to have suffered a loss of 30 per cent on his export sales during 1925 through inability to effect collections.

Casein Plastics

There is only one factory in Austria manufacturing galalith, the Akelit Kunsthorne-Werke A. G. with its plant located at Brunn am Gebirge, near Vienna. This factory has a capacity of 80,000 pounds per month, when working day and night shifts. For a short time, in 1925, it attained this production figure. During 1926, due to the depressed market for artificial horn, the production of this factory has averaged only 30,000 pounds per month. The Austrian foreign trade statistics list casein plastics under "artificial horn" and "artificial resin," so it is not possible to determine just how much is imported. However, since synthetic resin is produced in quantities permitting export of this product, it is reasonable to assume that practically all imports under the heading of artificial horn and artificial resin are in reality casein plastics. Of these commodities combined there were imported into Austria in 1925, 231 metric tons, valued at $190,143. The export figure of these commodities for the year 1925 was 403 metric tons, valued at $395,571.

Of the 231 metric tons of artificial horn and resin imported into Austria in 1925, 158 metric tons (68.5 per cent) came from Germany. The remainder came chiefly from the Netherlands, Great Britain, and Czechoslovakia. Of the 403 metric tons

The History of The Non-Metallic Fiber Gear

Quietness of operation and long wear contribute to the effectiveness and value

By T. C. Roantree

SOMETHING of the history and use of laminated phenolic gearing material was outlined by T. C. Roantree, Westinghouse Electric & Mfg. Co., East Pittsburgh, in a paper on "Non-Metallic Materials, the Part They Will Play in the Future of Gear Materials," presented at the second general session of the A. G. M. A. annual meeting.

This laminated phenolic product, a self-retaining material, was first used as a gearing material about 14 years ago. Early applications were experimental but as time went on the product underwent gradual changes, and it is now possible, said Mr. Roantree, to manufacture non-metallic gearing material that is unusually uniform in structure and with high tooth-carrying capacity. The material is said to be successfully used not only for spur gears, but for bevel, worm and herringbone gears, including herringbone of the Sykes tooth form. Quietness of operation is an outstanding feature of gears of this material, and to the reduction in noise was attributed, in many cases, the substitution of the non-metallic material for the satisfactorily performing metal gear. Another feature was said to be reducing of vibration, this being due to the resilient property of the material, which functions upon the meshing of its teeth with those of the metal mating gear.

Formula

It was stated that from recent tests it has been concluded that the tooth strength of the non-metallic material did not decrease as rapidly as in metals, when the pitch line velocity of the gear was increased. This

In connection with the article on the Patent History of the Molded Gears, by Mr. J. Rossman, appearing in the May and June issues of PLASTICS, the following article from the April 26, 1928 issue of THE IRON AGE will undoubtedly be of interest. As the commercial methods for the large scale production of the non-metallic gears are improved, their still greater application is expected.

element was said to be sufficient to change the Barth equation in

$$\frac{600}{600+V}$$

the Lewis formula from

$$\frac{150}{200+V} + 0.25$$

to . This change, in addition to establishing an added value, was said to rank the material as essentially a high-speed product because of its ability to function more satisfactorily in the high ranges than several of the metals used for gears, unless the metals have been heat treated.

The non-metallic material was also said to have advantages in conditions where the atmosphere is laden with dust particles, such as in cement mills, foundries, etc., in which applications the grinding action that develops when these particles fall upon the revolving gear teeth is relieved. The surface of the non-metallic material is less hard and more flexible than the metal and thereby decreases the abrasive action; the lesser particles may also embed themselves. Gears of the laminated phenolic material can be used in an atmosphere filled with acid fumes; and may in some cases even be submitted to occasional splashes of the acid solution. They are said to have been used to advantage in pickling, galvanizing and plating operations.

Used for pinions, the non-metallic material is said to result in less wear on the metal gears with which the pinions mesh. This preservation of the tooth surfaces of the large metal gear was stressed as prolonging the life of the gear, and, in many cases, justifying replacement of a metal pinion with one of non-metallic material.

It was estimated that 3,000,000 gears of this material will be used in the automotive industry during 1928.

Proposed Increase in Freight Rates for Molded Forms

There is a proposal before the Railroad Commissioners covered by Docket No. 34, Subject 240, which proposes to increase the freight rates on molded insulated articles and molded forms to first class in less than carload lots in the territory of the Official Classification.

The proposed charge means an increase of about 15% on the hundred pounds shipped.

The traffic representative of General Plastics, Inc., will appear before the commission during the week of July 10th to enter a protest against this proposed increase.

of artificial resin and artificial horn exported by Austria in 1925, 112 metric tons went to Czechoslovakia, 49 tons to Hungary, 47 tons to France, 40 tons to Great Britain, 26 tons to Poland, and 26 tons to Germany. (These exports in reality consisted almost entirely of synthetic resin).

Price of Casein Plastics

The price of casein plastics varies from $0.43 to $0.50 per pound according to quality and color. Prices at present are reported to be on a very low level and it is customary to grant discounts as high as 15 per cent.

Casein plastics are chiefly used in Austria in the manufacture of buttons, combs, and novelties such as smokers requisites, boxes, manicure sets, dominoes, chessmen, pencil and pen barrels. The only important importer is the Internationale Galalithgesellschaft Hoff which supplies the local consumers from stock.

The factories using casein plastics are small and their business is greatly hampered by lack of capital. None of them imports on its own account. Their finished products are sold throughout the neighboring states which formerly were integral parts of the Austro-Hungarian Empire. A small amount of business is also done with Great Britain, France and Belgium. Wares manufactured from plastics were exported to the value of $511,428 in 1924 and $854,428 in 1925. Export trade in these commodities during 1926 was reported to be greatly depressed.

Synthetic Resin

Synthetic resins are manufactured in Austria under the trade names of Juvelith, Resan, and Bakelith. Immediately following the World War the manufacturers of synthetic resin did not produce in sufficient quantity to supply the domestic demand and about half of the synthetic resin consumed in Austria was supplied by Germany. At the present time the manufacturers of synthetic resin fully supply domestic requirements and are building up a small export trade. In this commodity the domestic production is considered by the trade to be fully equal to the best German manufacture and no appreciable amount of synthetic resin is now imported from Germany. The current wholesale price for synthetic resin in blocks and sheets is $.36 to $.65 per pound, according to quality and color.

Synthetic resin is chiefly employed in Austria in the manufacture of cigarette holders and pipe stems. The finished products of the Austrian factories consuming synthetic resin are exported chiefly to the Succession States, but also in appreciable quantities to England, France, Germany, Belgium, and the United States.

Duty

In Austria the conventional duty paid on artificial horn and synthetic resin, applicable to imports from the United States, is 30 gold crowns ($6.08) per 100 kilos. The treaty which provides this duty, the Austrian-Czechoslovak treaty, expires on March 1, 1927. In the new commercial treaties now being negotiated with Germany and Czechoslovakia, Austria has placed the duty upon these plastics at 120 gold crowns per 100 kilos. While it is likely that Austria will have to recede from this figure before the treaties are finally ratified, some increase in the duty on plastics in the near future is highly probable.

The Austrian conventional duty on pyroxylin, applicable to imports from the United States will remain indefinitely as it is at present, 20 gold crowns per 100 kilos.

Promotion of American Trade

The market for plastics in Austria is quite small and at the present time opportunities for the sale of American synthetic resin and casein plastics may be said to be nonexistent.

There appears to be some possibility of developing the sale of American pyroxylin plastics in Austria, since at the present time all that is consumed in Austria is imported from Germany. The success of the direct sale of American pyroxylin to Austria will depend on the willingness of the American exporter to grant terms to Austrian import houses similar to the credit arrangements now made by German exporters with first class Austrian firms. These terms are reported to be 60 to 90 days sight draft. There may, however, be some possibility of an American exporter of pyroxylin finding an Austrian import house which is willing to stock celluloid and make payments against arrival of goods in Hamburg. Present business conditions in Austria are such that it would hardly be advisable for an American exporter to make better terms than cash against documents until satisfactory business has been developed and the American exporter feels justified from experience with its Austrian importer in granting more liberal credit terms.

Lists of the principal consumers of pyroxylin, galalith, and synthetic resin, as well as the manufacturers of synthetic resin and an importer of galalith may be obtained by accredited firms upon application to the Bureau of Foreign and Domestic Commerce, Washington, D. C.

Recent Trade-Marks

LIONITE. An Elastic Molding Composition adapted to be used for percolator handles, radio tube bases, push-button plates, toilet seats, bottle stoppers and kindred articles. Registration applied for by Lionite Insulation Corp., Brooklyn, N. Y. Ser. 237239. Sept. 14, 1926.

CELLESTA. Pencils, Varnishes, Motor Cars, etc., made from Cellulose Esters and the like. Used since June 22, 1920. Appl. filed Feb. 16, 1927. Ser. 244481. Verein für Chemische Industrie A.-G., Frankfurt-am-Main, Germany.

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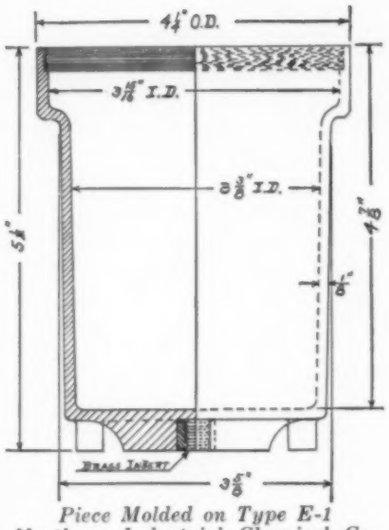
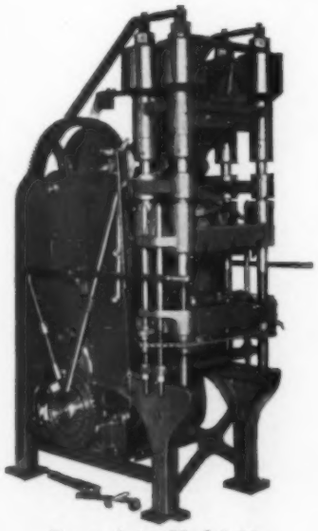


Piece Molded on Type E-1
Northern Industrial Chemical Co.

Working Area of Platens ..... 18½"x12½"
Maximum Adjustment of Upper Platen ..... 10"
Stroke, Standard ..... 12"
Motor ..... 3 H. P.
App. Weight ..... 4800 lbs.
Automatic Ejection

Type E-1—Model 50

No Accessory Equipment Required

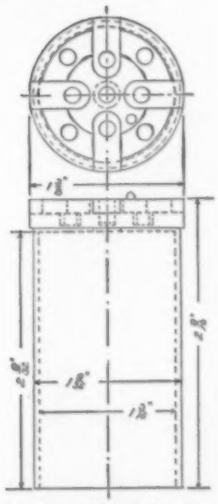


Type A-1—Model 50

Working Area of Platens ..... 18½"x12"
Maximum Adjustment of Lower Platen ..... 10"
Stroke ..... 5"
Motor ..... 1½ H. P.
Approximate Weight 4000 lbs.
Automatic Ejection

Different tonnages, stroke and platen areas available in either type.

Catalogue on Request.



Piece Molded on Type A-1
Pilot Electric Co.

TERKELSEN MACHNE CO.

330 A STREET BOSTON, MASS.

Printing on Celluloid

How some of the pioneers in this field laid down the foundations of this art

ON page 273 of the May issue of Plastics, we promised a few further patents on the difficult art of printing clean-cut designs on pyroxylin plastics. They are now given to our readers with the hope that it may serve to give them an idea of how much that is "new" is in reality quite ancient and honorable—for many an inventor lives too soon!

Charles F. Brady, of Brooklyn, N. Y., had a slightly different idea. He first impressed the design on the pyroxylin, then steamed the same to fix the ink, and then rolled the sheet flat again. This is somewhat combersome, but shows the trend this art took. Brady worked as follows, according to his U. S. P. 409,345 of 1889:

Brady's 1889 Process

"My process is carried on as follows: I first take a flat sheet of pyroxyline compound of any desirable thickness and subject it to the action of cold rolls, preferably of copper, which are engraved in any desired pattern or design, taking care that the engraving of the design shall be shallow and the pattern a light and open one, so as not to carry too much ink. I thus lay on the flat sheet of pyroxyline the color desired, using in the design or pattern with which the rolls are furnished any printing-ink of the desired color. By this operation the sheets are given the desired colored pattern. After the sheets are thus treated I subject them to the action of steam by placing a number of them at one time for this purpose in a steam-box or other proper receptacle so arranged or placed that each sheet can be thoroughly exposed on all sides to the steam action. The amount of steam should preferably be from three to seven pounds to the square inch. I leave the sheets in the box or other receptacle to be subjected to the steam action from five to thirty-five minutes. The exact degree of steam to the square inch to which the sheets are to be subjected and the amount of time during which they are to be exposed to the steam action are to be varied according to the amount of seasoning the pyroxyline compound to be printed upon has had, and can be easily ascertained by any person skilled in the nature and use of pyroxyline compounds. The above statements of time and amount are merely directory and can be varied within these limits according to particular circumstances. After being subjected to the steam-pressure it will be found that the flat sheet, while showing the design or pattern in its proper color and holding such color absolutely indelible and fast, are warped and wrinkled, and this disadvantage is to be overcome before they are fit for use. To overcome this difficulty and to make the sheets smooth and merchantable, and for this purpose only, I subject the sheets to any proper smoothing process —such as passing them through smoothing-rolls or any similar smoothing process. After the sheets are subjected to this

(*Continued on page 393*)

Resins from Phenol and Glycerol

THE field of glycerol-phenol resins has been enriched as the result of two patents issued to the Diamond State Fibre Co., (U. S. P. 1,642,078 and 1,642,079; Sept. 13, 1927) on applications of James McIntosh and Edwin Y. Wolford.

In carrying out the invention in a typical case, a mixture of 100 parts of phenol or of one of its homologs and 90 parts of glycerol or one of its derivatives such as epichlorhydrin, allyl alcohol, glycerol aldehyde, dihydroxyacetone, etc., is prepared. As a catalyst to initiate the condensation, twenty drops (based on grams in the preceding quantities) of sulfuric acid, or 40 drops of bromine is added.

The mixture is then boiled from six to eight hours under a reflux condenser at the end of which time the resulting liquid is transferred to an oven and subjected to a temperature of about 125°C. for further condensation. If this heating in the oven be stopped at the end of four or five hours, the material constitutes an inital condensation product that is soluble in alcohol, acetone, benzol and other ordinary organic solvents such as these; and is fusible at elevated temperatures.

Laminated Products

Laminated molded products can be made from this material by dissolving it in one of the solvents enumerated, and impregnating sheets, fabrics, etc. with the solution, after which the solvent is removed by evaporation. The thus impregnated sheets are then subjected in an hydraulic press or the like to a relatively high pressure such as 1000 lbs. per square inch and a temperature corresponding to steam at 100 lbs. pressure. The duration of the treatment is a function of the thickness of the sheets. Tubes are made in an analogous manner.

The hardness of the product can be enhanced by using as hardening agents, mixed with

the initial product during impregnation of the fabric, etc. such materials as hexamethylenetetramine, benzidine-acetone, sodium acetone-bisulfite and the like.

Instead of sulfuric acid or bromine as the catalytic agent, Bromine as the catalyst agent, pyridine, sulfur monochloride, aniline hydrochloride, acids other than sulfuric or bases such as ammonia, or acid salts such as bisulfates may be employed.

Resinoids Direct from Tar Oils

AN interesting process recently described is that covered by U. S. P. 1,658,-281; Feb. 7, 1928, of Reinhard Beutner, of Louisville, Ky., assigned to Aug. Nowack Aktiengesellschaft, of Bautzen, Germany. This accomplishes the preparation of bakelite types of resinoids directly from tar oils, and therefore presents a distinct advantage from the viewpoint of cost.

Raw Materials

Beutner employs as his raw material a "high-temperature" tar such as that produced by the Barrett Co. (New York). 200 parts of "25% tar acid oil" were mixed with 40 parts of commercial kerosene, 80 parts of 40% formaldehyde solution and 25 parts of normal sodium hydroxide solution, the mixture being heated to boiling under a reflux condenser for half an hour. After that, on cooling, the mixture settled into three distinct layers, an oily one on top, an aqueous layer at the center, and the resin at the bottom. It appears that the sodium hydroxide extracts the phenolic constituents of the tar acid oil and also catalyzes the reaction.

The most approved method is to employ a deficiency of formaldehyde in one batch, and an excess of formaldehyde in the other, afterwards mixing the resins obtained so as to secure a final product having the proper balance of phenol.

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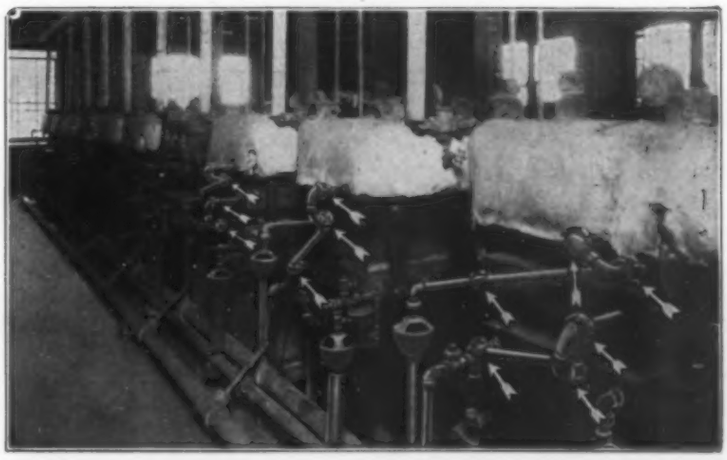

Proper molding is a vital factor in the manufacture of products from plastic compounds. Behind reliable press performance must stand dependable steam line piping. FLEXO JOINTS will not clog, break, burst or leak and insure a full flow of new steam at all times irrespective of the movement of the platens.

CATALOG?

FLEXO SUPPLY COMPANY

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Mechanical Properties of Resinoids

(*Continued from page 372*)

points equally distributed along the height of the block. (See Figure 1). These samples were then tested for bending stress and the figures obtained are as follows, being listed in the numerical order shown on the figure:

Table 3 (See Fig. 1, p. 371)

	Block I	Block II	Block III
1.	90 kg/sq.cm.	90 kg/sq.cm.	20 kg/sq.cm.
2.	210	210	
3.	350	240	160
4.	270	275	
5.	100	90	60

Samples of the identical material, cut into strips in the same manner but in the direction of the axis of the block (see Fig. 2) were tested in the same way and yielded the following results:

The number refer again to the S^{max}:

Table 4 (See Fig. 2, p. 372)

	Block I	Block II	Block III
1.	100 kg/sq.cm.	120 kg/sq.cm.	40 kg/sq.cm.
2.	230	210	150
3.	190	130	110

Rods cast from semifluid material, as in the case of *Juvelith*, equally well exhibited the marked changes produced by this streaming effect. The rods tested were 39 centimeters in length and were divided into three equal parts (as shown in figure 3). The S^{max} values for these three pieces were: 1. 350; 2. 530 and 3. 330 kg/sq. cm. The values here reproduced present unimpeachable evidence of the effect of the streaming upon the aggregation of the colloid particles. The central portions of the plates as well as the rods show the greatest strength as here the opportunity for the orientation of the particles meets with the least hindrance. Correspondingly, the values found at the parts near both surfaces are lower, as here any orientation that might have been effected by the streaming is disturbed by the swirlings and cross-flow of the material. As the mass becomes thicker, and especially if it is quite viscous, the orientation occassioned by the flow will be maintained in the central portions. This accounts for the inferiority of the Pollopas plates as contrasted with the strength of the Pollopas rods (cf. table above).

The rather destructive effect of the mineral filler, which undoubtedly adversely affects the degree of dispersion, becomes evident on a perusal of the data obtained for the third block, as this showed less elasticity. In peculiar contrast hereto stands the Bakelite block, wherein the effects of the addition of plasticizers and the action of heat and pressure is quite manifest, approaching optimum conditions.

The immediate practical results of the above observations are found in the fact that numerical data adduced on behalf of a given synthetic resin are practically meaningless when confined to the determination of a single mechanical property. In order to obtain a comprehensive idea as to the value and properties of a given material it is essential that the same be tested both in the form of rods as well as plates, and if possible also in the form of sections cut from plates that in turn are derived from blocks, the data being compared on the basis of the values obtained for the end and the central pieces.

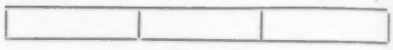


Fig. 3

Rubber and Pyroxylin

The use of mutual solvents to produce mixtures of various plastic materials is not particularly novel, but the cheaper and readily available solvents usually do not dissolve, in common, many of the plastic materials.

The various new hydrogenated products, such as the hydrogenated naphthalenes and phenols, and such products as cyclohexanol, are opening new possibilities in the line of plastics. For example, cyclohexanol will dissolve both rubber, vulcanized as well as non-vulcanized, while it is also a solvent of the pyroxylin plastics. A solution of these two substances, when allowed to evaporate, deposits a flexible film of rubber and pyroxylin, which may find application in plastics that have to exhibit particularly high resiliency and elasticity.

Extensive Use of Casein

During 1927 the United States imported, from Argentine alone, no less than 25 million pounds of casein. While much of this goes into paper sizing and adhesives, a large proportion is worked up into casein solids. The present vogue for inexpensive colored bead necklaces, is providing an excellent outlet for the casein plastics, and their general use is on the increase.

As the United States produces from 28 to 30 billion pounds of milk byproducts a year, it is to be regretted that not more casein is produced by the domestic producers, but is brought from such a large distance. Somebody is overlooking a bet.

Trade Names of Plasticizers

IN our German contemporary, *"Farben Zeitung"*, Mr. C. P. Von Hoek recently published the names of a number of commercial products employed as solvents or as plasticizers in the plastic industry. (Farben-Ztg. 1927, Vol. 32, p. 1737).

In order to supplement the list of trade-names given in our annual "Directory, Index and Buyer's Guide, we are reproducing these names, which are:

Anol. Cyclohexanol
Camphrosal. para-Toluenesulfamide
Di-Al. Diacetone alcohol
Dioxan. Diethylene dioxide
Erganol. Benzyl ether
Ergol. Benzyl bensoate
Hydrohexalin. Hydrocyclohexanol
Kamphol. Oxanilide
Lak. Benzene + amyl acetate
Methylanol. Methyl cyclohexanol.
Neu-Camphrosal. Para-toluenesulfamide
Pent-Acetate. Chemical pure amyl acetate
Pentasol. Chemically pure amyl alcohol.
Peralcol. Cyclohexanol + ethyl alcohol
Persprit. Iso-propyl alcohol.
Rodol No. 333. Methyl alcohol + methyl acetate
Solvent Aep. Ethyl para-toluenesulfonate
Solvent Kp. Cresyl para-toluenesulfonate
Tetralina. Tetrachloroethane.

The August Issue:

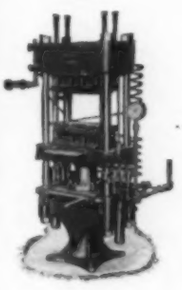
New Thermo Plastic Rubber Compositions Progress in Resinoids.

Byron B. Goldsmith's work on the Casin Plastics.

Properties of Cellulose Plastics.

MOLDING PRESSES
UPWARD or DOWNWARD

Fig. 1



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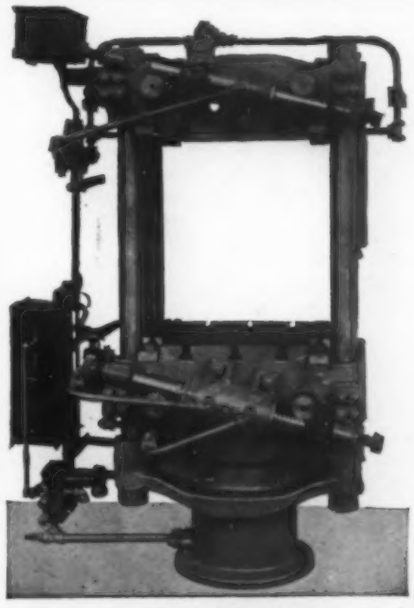

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TECHNICAL ABSTRACTS
AND PATENT REVIEW

Insulating materials from byproducts of the tar industry. Stade. In Teer, 1927, 25, 431, and 448. (German).

A general review of the utilization of pitches, tar, phenoplastics and cumarone resins in the manufacture of molded electrical insulating materials.

Chemical Constitution of Phenol-formaldehyde condensates. Effect of ammonia as condensing agent. S. Sugimoto and T. Komame, in Reports of the Imperial Industrial Research Institute, Osaka, Japan; 1927, 8, No. 7, pp. 1 to 46.

When molecular proportions of ammonium hydroxide, phenol and formaldehyde are allowed to react on each other a compound having the formula $CH_2O(CH_2)_6N_4.3C_6H_5OH$ results in practically theoretical yield. On heating this compound, ammonia escapes and a yellowish resin, convertible into product analogous to the A, B and C stages of phenoplastics results. Probable structural formulae for the phenolic condensation products are given.

Aminoplastic. British Patent 264466; Jan. 12, 1926. Interessen Gemeinschaft Farbenindustrie (German Dye Trust).

Urea-formaldehyde condensation products may be further hardened by the action of acids or their anhydrides. Examples showing the use of formic acid (vapor) and solution of hydrofluoric acid are given. The action may be limited to the treatment of the surfaces of the articles only, to harden them.

Molded laminated material with phenoplastic binder. British Patent 263878, Jan. 2, 1926. W. N. Briggs.

Sheets of fabric or other fibrous material are impregnated with a phenolic condensation product and formed into premolded shapes which are afterwards finally compressed and hardened.

Benzyl Cellulose. British Patent 265491, Oct. 1, 1926. Interessen Gemeinschaft Farbenindustrie (German Dye Trust).

The crude mixture obtained after the benzoylation is purified by treatment with an aqueous solution of common salt to convert the material into a brittle mass. The residual benzyl alcohol and benzyl chloride used for converting the cellulose into the benzoate are then removed by washing with a solvent such as benzene, followed by a washing with water.

Covering articles with sheets of cellulose acetate. British Patent 265257, Sept. 28, 1925. F. Ridley.

Sheets of cellulose acetate plastic are softened and rendered flabby by immersion in a solvent mixed with water, as for example a mixture of alcohol or acetone with water. The softened sheets are then wrapped around the article and allowed to dry. The shrinkage that takes place on drying causes the material closely to adhere to the object covered. (The process has been described before in connection with pyroxylin plastics, see Volume 1, PLASTICS, 1925, December, p. 84, in connection with German Patent 397919, Feb. 24, 1923).

Preparing Cellulose Acetate of Predetermined Viscosity. British Patent 263771; Dec. 24, 1925. British Enka Artificial Silk Co.

Cellulose acetates of predetermined viscosity may be prepared by carrying out the acetation in the presence of definite amounts of water in the acetylation bath. The highest viscosities are obtained when anhydrous actylyzing mixtures and perfectly dry cellulose are used as a starting point.

Manufacture of Cellulose Acetate. British Patent 263938 and 263939, October 6, 1925.

Acetylation of cellulose is facilitated by preliminary treatment of the same with the vapors of acetic or formic acid, or (second patent) with other organic carboxylic acids. An alternative is to treat the cellulose with the liquid acids, removal of the liquid and partial or complete drying prior to acetylation.

Cellulose Acetate and other esters. British Patent 264937, Oct. 30, 1925. H. Dreyfus.

The cellulose to be esterified is pretreated with acetic or formic acid, as described in British Patent 263938 and the esterification carried out by means of vapors of acetic anhydride or other vaporizable esterifying agent.

Malleable Phenoplastics. British Patent 265033, March 30, 1926. E. de Jarny.

Phenol is condensed with formaldehyde, using a comparatively large amount of an alkaline earth chloride (calcium chloride) as a condensing agent or catalyst. (Is equivalent to U. S. P. 1643447, Sept. 27, 1927).

Cumarone resins and their utilization. T. H. Barry. In Industrial Chemist, 1927, 3, 431, 436, 479 (England).

This is a general review of the cumarone resins. Some of these find application in the plastic industry.

Blood as a base for plastics. E. J. Fischer, in Kunststoffe, 1927, 17, 173, and 225.

A general review of the utilization of blood for the manufacture of various plastics, artificial leather, linoleum and the like. Mainly based on recent German patents.

Esterifying Cellulose, formic acid as aid in. British Patent 263128, Dec. 19, 1925. Interessen Gemeinschaft Farbenindustrie (German Dye Trust).

Cotton, or other form of cellulose that is to be esterified is treated with formic acid in order to facilitate the action of the esterifying agent.

Fibrous cellulosic material is mixed with a fusible resin such as asphalt or the like and pressed into boards which are coated with an acaroid resin varnish, followed by a second pressing. Plasticizers such as methyl para-toluenefulfonamide, triphenyl phosphate or triacetin may be added. (See analogous U. S. P. 160728 and 163491).

Electrical Insulating Material. British Patent 271948, March 4, 1926. Western Electric Co.

A fibrous material such as cotton, wool and the like is first treated with distilled water and then with an electric current in a damp atmosphere. After this the cotton is immersed in a saturated solution of calcium hydroxide. This is supposed to render it more suitable for incorporation in insulating material.

Plastic Material from leather waste. British Patent 271221, April 13, 1926. British Glues and Chemicals, Ltd., R. Duncalfe and H. Cotes.

Proteid scrap from glue manufacture, as for example deglued hides or leather is mixed with a binder such as casein or a resin and calcium chloride and the mixture strongly compressed after which it is indurated and rendered insoluble by treatment with ammonia as in the case of the casein solids.

Cellulose Acetate Manufacture and Acetic Acid Recovery. British Patent 268778, April 1, 1926. Verein f. Chemische Industrie A.-G.

The residual acetic acid remaining after a batch of cellulose has been acetylated, and without removing the cellulose acetate, is recovered by vacuum distillation of the mixture, at temperatures ranging from 50 to 90° C. The remaining solution of cellulose acetate is then precipitated with water to separate the cellulose acetate. Better recovery of acetic acid is thus effected.

Recent Books

Non-rubber Molded Insulation. (Gummifreie Isolierstoffe). By Dr. Ing. Arthur Sommerfeld. Published 1927 by Zentralverband der deutschen elektrotechnischen Industrie E. V., at Berlin.

Dr. Arthur Sommerfeld, one of the well known German engineers connected with the electrical industries, and a technical director of the Suddeutsche Isolatorenwerke at Freiburg i. B., Germany, has written a very interesting 103 page book (in the German language) on the general subject of Molded Insulation (not including rubber compositions). This has recently come to our attention and comprises, after a short historical introduction, much valuable information on the technology of the modern resinoid molding materials.

The book covers the nature of the resinoids, the use of the various fibers, fillers, binders, solvents and the like. The methods of mixing, compounding and pressing is fully completely and accurately discussed, showing the most advanced European practice. The "die-casting" type of molding as well as the necessary finishing operations are likewise discussed.

Classes and Tests

An important chapter of the book deals with the properties of the molded material and the standard methods of testing the same, the diverse apparatus employed for this purpose being described and illustrated. The main tests comprise

(A)—Mechanical and Heat Tests
1. Bending strength
2. Impact breaking strength
3. Scleroscope hardness
4. Resistance to heat
5. Resistance to fire.

(B)—Electrical Tests
1. Surface resistance
2. Internal resistance
3. Resistance to arcing.

The apparatus described and illustrated includes that employed in the Martens heat test, the tensile strength and pendulum type of impact testing machines.

A chapter is also devoted to the various types and classes of the molding materials as developed in Germany, giving tables and constants of the products. The technical considerations in the design and in the ordering of molded insulation are taken up in considerable interesting detail. The proper shape of dies and finished pieces is described and very fully illustrated. Quite a number of the commercial applications of molded products is discussed and various examples of finely molded articles are shown in half-tone illustrations.

Specifications

A chapter is also devoted to the German standard (VDE) specifications.

While not as comprehensive as Hemings "Molded Insulation" or Ellis

(*Continued to Page 391*)

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Starch—Sulphur Products Described

Thermo-set material comprising inexpensive products recently patented to well-known inventor in the plastic field. Should be useful

THE aim of all workers in plastic materials is to lower their cost to a point where they may compete with natural products such as wood and metal. While much progress has been made, and while the resinoid products have become very much cheaper within the past year, a natural limit to the further lowering of prices is set by the cost of the raw materials. Therefore any process that is likely to produce a product from very cheap materials is of considerable interest.

Carleton Ellis, who has already done a great deal of work in the synthetic resin field has recently patented some thermo-set compositions based on starch and sulfur. Both of the patents (1,664,600 and 1,664,-601) issued on April 3, 1928 and, in substance cover the following:

Cassava Starch

The first patent relates to a mixture of cassava starch and fillers.

The composition employed in carrying out the present invention comprises, besides casava starch, a filling material, a fusible binder and usually a certain proportion of water or other starch-swelling constituent.

The filling material may be wood flour, ground wood, paper or paper pulp, linters, flock, asbestos fiber, china clay, talc, whiting, iron oxide pigments and the like.

The binder preferably is sulphur, with or without phenol-sulphur chloride resin to modify its melting point and suppress (to some extent at least) its crystalline character.

Other binders may be employed along with sulphur, e. g., rosin, ester gum, Congo resin, cumaron resin and the like.

THAT the art of molding is not necessarily limited to resinoid and similar organic products, is plainly evident from the progress realized in recent years in the utilization of cheap, readily available materials.

Water preferably is employed as the starch-swelling agent and may receive additions of glucose, glycerol, glycol and the like.

Casein, glue, cellulose sulphite waste liquor, water glass and similar adhesives may be employed along with the cassava starch. In some cases the cassava starch may be admixed with other starches.

An illustrative composition may be prepared by mixing with thorough agitation.

	Pounds
Wood flour	690
Cassava starch	413
Sulphur	240
Water	565

The mixing is preferably conducted in a ball mill, or Werner Pfleiderer mixer or similar effective agitating apparatus. To obtain the product of the present invention, a moist mixture, such as the foregoing, is charged into a heated mold and subjected to heavy pressure in a hydraulic press at a temperature above the melting point of sulphur and preferably between 150° and 200° C. On exposure to such heat and pressure for three to five minutes the binder melts and disseminates more effectively through the filter, the starch granules burst by the action of the water more or less converted to steam and thus the composition is given a flowing quality, spreading throughout the mold to yield a good molded article which is firm and fairly rigid. The action of the heat, steam and pressure is to cause themo-setting, that is, the composition at first flows and forms into the shape of the mold, then hardens so that on removal hot from the mold, the article is not easily deformed in handling. The mold is best made in a manner such as to allow the escape of some moisture during the molding operation. This tends to give some porosity, which in turn confers lightness on the finished article. Molded containers, such for example as cigar boxes, artificial lumber and so forth thus may be made of relatively low specific gravity.

Strength of Product

Unusual strength is conferred (in molded products from compositions as herein described) by the employment of cassava starch. The latter starch, moreover, is not costly and the composition therefore may be made from inexpensive raw materials.

From the foregoing it will be evident that the preferred form of the invention comprises as a final product, a porous thermo-set molded product including a binder comprising sulphur, a filler and ruptured granules of starch, preferably cassava starch, obtained by the action of moisture under heat and pressure and further embraces the process of making molded pro-

ducts which comprises exposing to heat and pressure in a mold, a moist mixture of cassava starch, sulphur and a filler, say wood flour, at a temperature above the melting point of the sulphur and adequate to cause the rapid rupturing of the granules of said starch; whereby flowing throughout the mold results, allowing steam to escape from the mold and removing the shaped article from the mold, as a substantially thermo-set product.

The second patent omits the sulfur and employs powdered rosin as the main binder.

A composition which may be made cheaply is composed of the following illustrative ingredients, the proportions being by weight:

	Parts
Powdered rosin	140
Cassava starch	240
Wood flour	440
Water	400 to 500

These ingredients are mixed in a Werner & Pfleiderer mixing machine, or other suitable mixing device, and when uniformly mixed the composition is ready for use.

A quantity is placed in a hot mold and the plunger applied, giving a pressure of several pounds, or more, to the square inch. Preferably the sides of the mold are made slightly tapering to allow the escape of steam, or the plunger may be withdrawn part way during the first stages of the pressing, as this procedure permits of the escape of excess moisture. The temperature is preferably between 150—200°C., although higher temperatures may be employed in some cases.

An object is to have the proportion of water such that it is absorbed by the wood flour and when the mixture is subjected to hot pressing, the moisture ruptures the cassava starch granules, and the starchy solution or paste thus produced forming about the rosin and wood flour creates a condition whereby the composition tends to harden in the press and thus makes pos-

(*Continued to page 390*)

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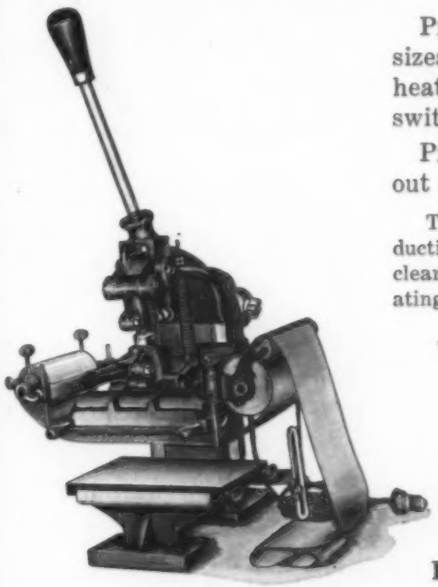

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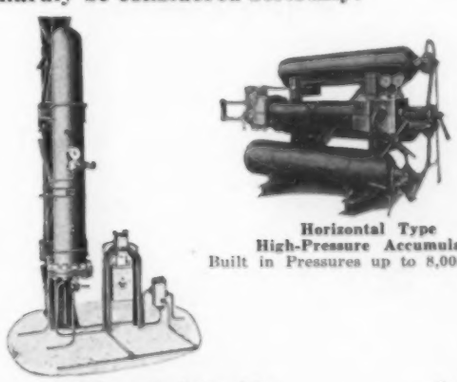

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THE use of magnesium oxychloride as a cement, in combination with various fillers, or aggregates, under the names of Sorel cement, artificial marble, etc., has long been known as a useful material for flooring, roofing, wainscoting and the like. However, certain limitations are inherent in the product heretofore evolved that render it unfit for the production of articles such as vases, candlesticks, ash trays, napkin rings, buttons, etc.

These limitations arise from the fact that air, or gas, cavities develop during the setting process which render the product unsightly and incapable of receiving a high polish; the appearance of cracks during the seasoning of the article after removal from the mold; the appearance of efflorescence on the surface, which destroys the beauty of the colors; and the impossibility of obtaining strong colors, such as blacks, blues, reds, greens in the final product, together with sufficient hardness when using formulae providing for a large percentage of filler.

The elimination of all these obstacles, and the further advantage of being able to machine the material before it has hardened, producing at once a highly colored, beautifully veined and polished surface, is the object of a recent invention described by George B. Bergen, in his U. S. P. 1,638,821; Aug. 16, 1927.

The first departure from established practice consists in the use of a much weaker solution of magnesium chloride, preferably 17 to 19 degrees Baumé Another departure is the discarding of all or nearly all filler: A third variation is the substitution of a large proportion o coloring matter for the discarded filler. A fourth and perhaps, most important, point, is the time that is allowed to elapse between the various steps in the process.

Only the very impure articles of commerce, that is, magnesium oxide (ground and calcined magnesite) and magnesium chloride are used in the process. Having prepared a rather dilute solution of the latter, it is used to wet the oxide, making the mixture of the consistency of soup or cream. This is allowed to stand for about one hour, or till the initial set, or thickening, begins to take place. The mixture is then stirred, thinning with more magnesium chloride, if necessary, and divide it in several portions, according to the number of colors desired in the finished article.

Coloring pigments, preferably alkali-proof colors, are then added in proportion by volume of about one to three or four and thoroughly incorporated by stirring, more magnesium chloride solution being added to keep the mixture like cream. These separately colored very fluid portions are then left quiescent for three to four hours or until the mixture will barely slide from a spoon. In this condition, the colored masses will not intermingle when brought into conjunction, and they are then piled in alternate layers on a platter or glass, shaking or rapping the support to produce thin-lined veining.

This mass is now allowed to remain quiescent for a period of from four to six hours, or until the surface seems hard and nworkable to the touch. The whole mass is now forceably removed by squeezing and kneading and rendered it plastic like modelling clay. The manner of kneading will determine to a large extent the character of the veining in the finished product. If the mass has stood too long and tends to crack and crumble, the moistening of the harder portions with magnesium chloride solution will soon render the entire mass pliable.

This mass is then molded about a mandrel of the desired shape and size and let it stand for from one to ten hours when it can be turned in a lathe by using a sheet metal form, corresponding to the longitudinal cross section of the finished vase. The surface may be moistened if necessary, from time to time, during the turning process.

Starch—Sulphur Plastics

(*Continued from page 389*)

sible the removal of the molded article while it is still fairly hot. This enables the pressing operation to be carried on rapidly without the necessity of cooling the mold before removal of the plastic article.

The invention therefore comprises molded articles made from cassava starch, a resin and a finely-divided extending agent and the process specifically adaptable to a molding composition containing water is that of carrying out hot pressing under conditions which allow of the escape of steam, whereby further drying out in the mold occurs and hardening takes place sufficiently to enable the withdrawal from the mold of a molded article, which, although hot, is not readily deformed by the handling which necessarily ensues.

British Resinoid Researches 1926-7

By A. C. Blackall
British Correspondent of Plastics

The Report of the Committee of the British Privy Council for Scientific and Industrial Research for the year 1926-27 was recently published by H. M. Stationery Office in London. The report, as usual, contains a summary of the work carried out by the various research reorganizations of the Department of Scientific and Industrial Research during the year and the following mention is given to synthetic resins:—

"Resins have been obtained by alkaline treatment utilizing a special controlling procedure. Special purification processes have been applied to such resins. They were then made into molding compositions with wood and other inert substances and the physical properties of the moldings examined. A process for removing the volatile matter by means of alcohol vapor has been protected by patent, to which the attention of firms likely to be interested has been drawn."

RECENT BOOKS

(*Continued from page 387*)

"Synthetic Resins", the book contains considerable valuable and interesting data in this field, and should prove acceptable to those who can understand technical German. The book is obtainable from Julius Springer, Verlagsbuchhandlung, Berlin W-9, Germany.

A New Chemical Encyclopedia

CHEMICAL ENCYLCLOPAEDIA. An Epitomized Digest of Chemistry and Its Industrial Applications, by C. T. Kingzett, F. I. C., F. C. S. 4th Edition. D. Van Nostrand Co., New York. 1928. 807 pages. $10.00

From personal observation we are well aware of the difficulty that besets the business executive and editorial writer when there is quick need of some essential information relative to the ever growing field of modern applied chemistry. The literature of this art and science has grown at such an astounding rate that text books that were considered standards

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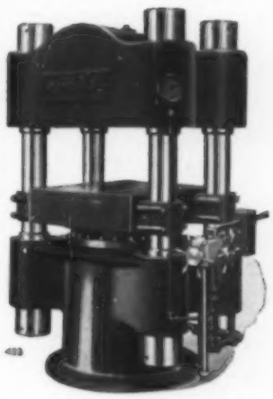

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but a few years ago are already virtually obsolete. Only a few comprehensive chemical dictionaries exist. The really good ones are entirely too large, expensive and cumbersome, so that they are unavailable for rapid desk reference. The smaller so-called "chemical dictionaries", on the other hand, are too condensed and in most cases do not contain further references or "leads" that will enable the user to glean further information relative to the article or subject in which he may be interested at the time.

The recent appearance of **Kingzett's "Chemical Encyclopaedia"** appears to fill a long-felt and urgent need, and practically for the first time makes available within a single cover a wealth of practical chemical information all arranged in strictly alphabetic order—a great advantage to one not technically trained!

Arrangement

Under each heading or entry there is given more than a mere definition, all the essential data as well as references to the literature of the product being included as well. This is a distinct and valuable departure from ordinary dictionary practice. As the book was written in England and evidently intended for British readers, the references are mostly to publications available in England, such as British Chemical Abstracts, Chemical News, Chemical Age (London), Chemical Trade Journal, Industrial Chemist, Journal of the Chemical Society, etc., although the Journal of the American Chemical Society is included.

Every executive of a concern at all interested in products in the production of which chemistry plays a part (and that includes, today, practically every plastic product) could find much valuable information in this new work. For example the heading "Cellulose" covers about three pages, and closes with references to standard books and a number of periodical articles. A further valuable feature is the listing of quite a few materials under their Trade-Mark or Trade Name, as for instance Bakelite (p. 59-60), Galalith (p. 306), Glyptal (p. 334) etc. Under the item of "Gums and Resins" all of the known resins are alphabetically catalogued and described.

A careful perusal of the work shows that great pains have been taken with it in order to insure accuracy as well as good appearance. It will undoubtedly find its way to the desk as well as the libraries of most chemists and those engaged in technological pursuits.

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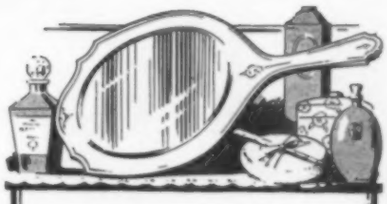
WANTED
A specialist who has a technical, selling or trade experience in the plastics field wishing a permanent connection with a merchandising organization as writer and lay-out man. Write giving full details as to experience, etc., Box 99, Plastics, 114 E. 32nd St., N. Y. C.



Good Mirrors will guarantee approval of your Product

Standard Mirror Co
151 - 157 HARRISON STREET
Buffalo

Printing on Celluloid

(*Continued from page 382*)

smoothing process they will be found to be flat and unwrinkled and ready for use. Subjecting the sheets to this smoothing process does not affect the permanency of the colors, either to increase their permanency or to diminish it, the colors having been made indelible, by the previous operation of first laying the color on by the pressure and afterward rendering them fast by subjecting them to the steam-heat.

"The sheets printed with colored patterns by my process are rendered so indelible as not only to resist the action of water but also of perspiration, alcohol, and even the scouring action of sapolio or sand and water. They therefore are peculiarly adapted for the manufacture of collars, cuffs, shirt-bosoms, and other articles which require frequent washing."

Roehm's 1905 Method

Twenty three years ago, June 6, 1905, one of the patents owned by Whitehead & Hoag Co., of Newark, N. J., was issued on an application of Richard E. Roehm. This was 791503, and was based on the idea of rendering the pyroxylin porous and plastic so that it could be printed upon, following which the sheets were subjected to great pressure under heat. Incidentally it might be mentioned that this company became one of the largest and most successful decorators of celluloid in the world, and is still one of the leading producers of celluloid advertising signs, badges, the familiar "campaign buttons" and the like, with a huge modern well equipped plant in Newark, N. J. According to this particular process, Mr. Roehm stated that

"I have found by long and repeated experiments that in order to give permanency to the ink it is necessary to first prepare

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Solvents

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Send your Articles to us and our Chemical Dept. will produce the required finish and formulae for you.

Jos. H. Meyer Bros.
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220 Twenty-fifth St., Brooklyn, N. Y.
Display Offices
389 5th Ave., New York---804 Walnut St., Phila., Pa.

the material to be printed upon, so that it will receive the ink and at the same time avoid spreading. I have also found that after the printing has been done some means must be provided for protecting the ink.

Chemicals Used

"In preparing the sheets I momentarily saturate them with a solution which acts chemically upon the ingredients in the pyroxylin material to disintegrate or dissolve the surface of the sheet to a limited extent, which renders said surface plastic and somewhat porous to receive the ink. I do not limit myself to any particular solution or chemical which will produce this plastic coating, as it will be evident that various solutions will produce the same results, such as amyl acetate. After this coating has dried I then pass the sheets through rollers upon which is applied an adhesive solution. This gives an additional body to the porous surface formed as above recited and upon which the ink is placed during the process of printing, the ink sinking through the porous surface to the main body of the sheet. After the printing has been done and the ink dried upon the sheets I place them, preferably, between sheets of metal, making as many layers as I have room for in the press, which is especially constructed for this purpose. I then place them in a steam-press, in which great pressure is brought to bear upon the ink, and this, together with the heat caused by the steam-chamber, forces the ink into the surface, while in its plastic state. When this is complete, I turn the steam off the chamber in the press and pass cold water through the chamber, so as to chill the printed sheets still under pressure. The chilling of the sheets at the end of the process causes the sheets to lie smooth and flat and returns them to the condition in which they were before the process is begun."

MOLDED PRODUCTS

Devoted to the purchase, further use and merchandising of all manner of molded parts

Vol. 2 JULY, 1928 No. 7

Who Buys Molded Parts?

This article attempts to answer the above question in some small degree

By J. A. Maguire

THE interest in the use of molding materials is so wide spread that it might properly be said to cover the entire industrial field. The reasons why this is so are almost as varied as the uses to which plastics are put. The basic reasons however can be covered by one sentence. Increased sales and reduced manufacturing costs. This is the end to which every manufacturer is striving. How well molded products is able to solve some or all of these problems is illustrated by the way in which they are taking the place of other materials.

Plastics Subscribers

The question is sometimes asked by the ordinary layman, "Who uses molded products". The question could better be put "Who does not use molded products". Taking the list of subscribers to our publication Plastics, as a guide, the interest in molded products covers almost the entire industrial field. Indeed it would not be any stretching of the facts to say that the entire industrial field is interested either directly or indirectly.

Types of Users

Industrial concerns from the very largest on down to the little shop employing only one or two people are on our list of subscribers. It is read by the research men of the giant automobile companies on the one hand, and by the manufacturer of hair pins on the other. Makers of telephones and makers of dentist drills alike, prove their interest in molded parts by their interest in Plastics.

Some idea of the widespread interest in plastic materials may be had by looking over the list shown below which covers by no means all the lines who read this publication but is merely picked at random from our list of readers.

Manufacturers of—

- Automobiles, passenger and trucks,
- Toilet seats,
- Cigar & Cigarette holders,
- Soda water apparatus,
- Chairs, dentist, barbers, etc.,
- Firearms,
- Push buttons,
- Radio sets,
- Stoves and ranges,
- Electrical & Radio supplies,
- Receptacles & Sockets,
- Telephones,
- Toilet articles,
- Vacuum cleaners,
- Vibrators,
- Tooth brush,
- Refrigerators,
- Clothes washing machines,
- Cooking utensils,
- Dishwashers,
- Fans & motors,
- Farm equipment,
- Store fixtures,
- Heaters, water etc.,

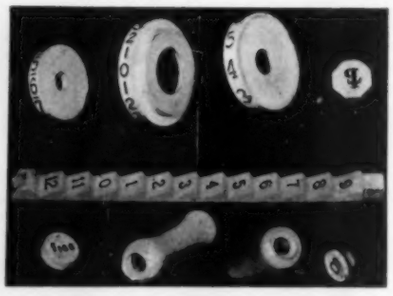
Molded Bakelite-Micarta propeller. Showing size possible to obtain in molded parts.

Battery holders,
Pressing irons,
Locomotives,
Marine apparatus,
Musical instruments,
Cameras,
Billliard & pool tables,
Buttons,
Cutlery,
Dental Supplies,
Fountain Pens,
Surgical trusses,
Pianos,
Music rolls,
Eye glasses & goggles,
Fishing reels,
Sporting goods,
Pipes-smoking,
Advertising novelties,
Office supplies,
Boots and shoes,

It is possible to carry this list on almost indefinitely. However taking the list at random we get some small idea of the varied uses to which molded parts and plastics in general is put. In the case of the automobile concerns, the uses to which molded products are put seems endless. Ignition system parts, timing gears, door handles, cigar lighters, gear shift balls, etc. Various reasons can be given for the use of plastics for each of the uses given. For instance in the case of the phenolic laminated gears in the timing apparatus of autos. These are used primarily for the reason that they do not make the noise made by metal gears. They are as strong if not stronger than metal and in addition do not have the tendency to make a noise like a coffee mill after being worn down a trifle.

In the electrical supply field molded parts have been in use for some time for various purposes such as sockets extention plugs and the like. Some time ago the production manager of a large firm that was producing electrical fixtures, particularly floor lamps and similar articles, was faced with the problem of deciding upon the material to be used in making a new line of lamps that had been designed by their staff of creative artists.

The material which they had always used for this purpose was



A selection of pyroxylin plastic parts used in office machinery.
(Photo from articles supplied by Celluloid Corporation)

metal, and this was the type of material used by all their competitors. The production manager had heard of lamps, particularly smaller ones, that had been made from molded materials, but the problem of molding a large floor lamp support was one that he could not solve for himself. There was a conference called in the organization and the plan was evolved of making the lamp base in sections, each of which would be made separately, and then fastened together.

Completely Molded

There was nothing very new or startling about this idea as brass chandeliers had been built in this manner for years, but in that case there had always been a concealed metal pipe, so that most of the fixture had been purely camouflage. However in making the new lamp stand from molding materials, it was found possible, due to the accuracy with which the material could be shaped, to mold threads on the various sections and assemble the entire lamp base by screwing the various parts together.

By a suitable choice of sections, many different styles could be built up, an fact it was found possible to use some of these sections for table lamps as well.

Labor Saving

Take the case of the manufacturer of electrical apparatus who was about to turn out a new high grade pressing iron. This firm's experience was related in a late issuc of Plastics. They wanted a handle that would stand up under hard usage and still retain its finish. The handle must also hold a three heat rheostat switch. Any other material than a molded job would have entailed an endless amount of labor and machining. This firm had used molded parts in the past and were familiar with the characteristics of the material and knew what to expect. The result was another job for the molder.

The soda fountain trade has in the past three years become

Bottle top of molded phenol resinoid. (Photo courtesy Woodworth Inc., New York).

(Continued to page 413)

A New Plastic Material

This new material is made in wonderful color combinations and should find a large market

The phenolic resinoid group of molding powders are well known and their working qualities familiar to most of the manufacturing companies using plastics. When one thinks of phenolic compounds, one thinks of a molding powder that when subjected to heat and pressure can be molded into a permanent shape which has high heat resistance, low water absorption, low dielectric loss, is insoluble in acids or solvents and a number of other advantages.

The past six months has seen a new product go on the American market, known as Catalin. This material is classed in with the phenolic resinoid group, but unlike the other resins it is not furnished in the form of powder to be molded, but is sold in the form of blocks, rods, sheets or special forms.

Readily Machined

This material unlike the other resinoids lends itself readily to machining. It can be turned on a lathe worked on a milling machine, blanked out of the sheet and has working qualities somewhat similar to the pyroxylin plastic materials. Combined with these working qualities it is practically fireproof, is odorless, and being non-hydroscopic will not absorb moisture.

Like the other phenolic materials it is not affected by acids or any of the ordinary solvents. The only thing that seems to affect it in any way is a concentrated solution of strong alkalies, such as lye.

Catalin has a tensile strength of 8260 lbs. per square inch. Specific gravity of 1.284 in green white color and 1.12 in transparent amber.

THIS new member of the plastics field has a wide range of possibilities. Its color range is almost unlimited, it is readily worked on milling machines or lathes and in addition to this has some of the qualities found in the phenolic group, such as the non-burning feature. This feature will no doubt appeal to many manufacturers that for one reason or another have found it impossible to make use of some of the older plastic materials.

So much for the material from a working standpoint. From the standpoint of color it is a revelation. The colors obtainable in this material are practically endless. All the ordinary colors can be gotten in opaque. In translucent shades they have turned out some marvelous imitations of marble, onyx, quartz, etc. In these colors particularly this material has to be seen to be appreciated. It has a depth of color texture that is almost unbelievable, this factor is well illustrated in a sample of rose quartz seen by the writer.

Potential Market

Although only on the market for some six months this newcomer in the plastic field is meeting with wonderful success. It has found its way into a number of novelties, such as shaving brush handles, poker chip sets etc. It is also being sold to the clock trade for small mantle and desk clock cases. For this purpose the manufacturers furnish the material in special molded shapes in lengths long enough to produce several clocks. The fabricator saws these lengths off to the desired size, finishing the job on a buffing wheel.

Automotive Field

One of the large automobile companies has standardized on this material for use on one of their new models. The instrument panels, gear shift balls and dome light are all made of Catalin.

There is no doubt that more will be learned of this material as time goes on. And like other members of the plastic family it will drop into its place in the industrial field. All its other qualities combined with its workability and an unlimited color range assures it of this.

General Plastics, Inc. Increases Staff

Mr. C. F. Landsheft has been appointed as head of the Development Laboratories of General Plastics. Mr. Landsheft was formerly Chemical Engineer in charge of Hot Molding Mixture Development of the Westinghouse Electric & Manufacturing Company at Pittsburgh, Pa.

Mr. G. M. Loomis joined the General Plastics organization June 16th as Plant Engineer and will have supervision of Maintenance and Construction.

Story on Molded Wall Plate in an Early Issue

Color In Electric Iron Handles

Well known merchandiser makes use of colored phenolic resinoid moldings to dress up this article

COLOR sells! Even at the risk of seeming tiresome we want to restate this well known fact. The buying public no doubt is peculiar in its likes and dislikes, however the wise manufacturer and merchandizer takes advantage of conditions as they are instead of trying to change them. Today the public demands color in the articles it purchases. This applies not only to items in which one would ordinarily expect color but also to articles that would appear to have only a utilitarian purpose.

Color Demand

In the modern home the vogue seems to be to have the furnishings match up as to color. In kitchen furniture the displays of some of the larger merchandizers show gas ranges, refrigerators, kitchen cabinets, etc., all in the same color shade. This type of house furnishings is outselling the older types of natural wood colors to a large degree.

Contrast

Take the same item, a gas range for instance, make one in the old style with black handles on the oven doors and gas cocks, with the stove proper in either black or white enamel. Take the same stove and have it enameled with one of the pastel shades, have the oven handles and gas cocks made of colored casein or phenolic molded compound and see the results on the sales of the two stoves.

Taking advantage of this demand for color in the merchandizing field one of the greatest organizations of its kind, R. H. Macy & Co., of New York whose merchandize turnover runs into millions of dollars yearly have recently placed on sale a new electric iron. This iron is known as the Red Star. The name is derived from the fact that the handle of the iron is made of molded phenolic resinoid of a bright red shade. Not only the handle but also the wiring connections and plug are of the same color.

Other Advantages

Even if the handle had no other advantage than its color it would outsell the same iron with an ordinary black wooden handle. However those who have used molding materials for iron handles know that it has a number of advantages besides its color. The insulating value of the phenolic resinoid molded

(Continued to page 413)

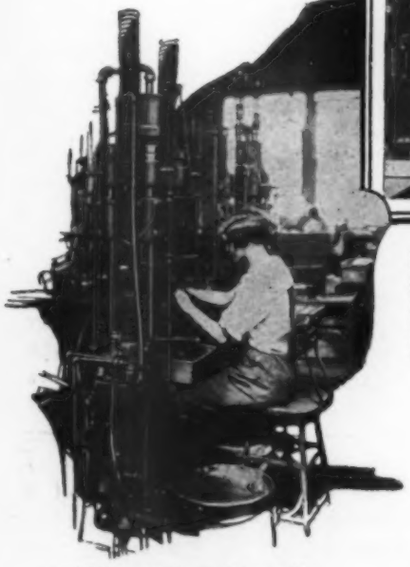
This Mass Production Means Lower Costs

The facilities of G-E molding plants, which have produced millions of Textolite Molded parts for use in G-E products, are now available to the entire industry.

Careful research, the best of materials, and skilled design combine to produce superior molded parts at low cost. Five years of experience, in which G-E made more than 375,000,000 pieces, have brought production methods to highest efficiency. The resources of General Electric make these plants a dependable source of a high-grade product.

If you need custom-molded parts of proved reliability and economy, telephone your nearest G-E office.

A production aisle in the hot-molded department. Note that the most modern equipment is used to decrease manufacturing costs by scientific mass production



This trained operator molds thousands of intricate pieces every day. Hundreds of such operators are needed to meet the demand for G-E Textolite Molded

An aisle in the cleaning department. After cleaning, the beautiful polished pieces are ready for packing

GE Textolite Molded

885-12

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Beauty Parlor For Commercial Articles

The custom molder fills the place of beauty expert for the manufacturer

By J. A. Maguire

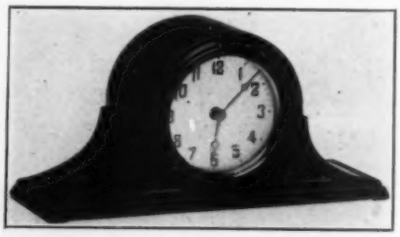
MORE attention is being paid to the general appearance of ordinary articles of commerce today than ever before in the history of industry. This applies not only to the articles themselves but also to the containers in which they are sold over the counter to the ultimate consumer. Dress up! Beautify! Improve appearance! These are the slogans of business today. The firm that does not realize the value of good appearance in their merchandize in making sales is the same firm that seems to be unable to explain why their sales are falling off.

Feminine Influence

Some experts tell us the reason for all this demand for beauty of form and color in merchandize is due to feminine influence. We are told that women influence either directly or indirectly over 80% of all the purchases made. That women themselves place a high value on their own personal appearance goes without argument. Should anyone care to dispute this fact, let them take into account the amount of money spent yearly on cosmetics of various sorts and in "beauty parlors."

Pearl pyroxylin-sided drum, one of the instruments used by Paul Whiteman's orchestra and made by the Leedy Manufacturing Co., Indianapolis, Ind.

The wise manufacturer will adapt his product to this trend. He will have to either dress up his products and containers himself, or better still, take them to a beauty specialist. Some manufacturers have already solved their problems by the use of one of the three groups of plastics, Phenolic resinoid, Pyroxylin plastics or Casein. Others are daily bringing their problems to the custom molders or fabricators of one of these products. They have found a "beauty shop" for industrial products.



Office clock with case molded in one operation from phenol resinoid.

Like all other beauty shops, this industry is not an infallable aid to improvement. It is not a "cure all". However the manufacturer who wishes to make use of any of the plastic group of materials in his article, can readily find out just what value it would have for him, by calling in any reliable custom molder or fabricator.

Proper Advice

If molding materials will not prove of any particular value to the article in question and manufacturer may be sure that the molder or fabricator will not press its use. The reason for this attitude on the part of the custom molder is that it is good business for all concerned. It takes up too much of the molders' time getting tooled up for the job to waste any time on a job that will not give him volumn production. Why should he waste his valuable time and effort for nothing? His profit is made on production and not on tools and molds.

Therefore the manufacturer who brings his product to this particular type of "beauty parlor" can depend on getting not only expert, but interested advice.

Case In Point

One of the outstanding instances where the modern manufacturer solved his problem by the use of plastics is the case of the fountain pen industry. A few years back practically all fountain pens were made of sombre black rubber. Some of the leading manufacturers of pens saw the value of getting color into their product. They turned to the pyroxylin industry for help. Today at least 80% if not more of the pens in this

(*Continued to page 402*)

A desk cigar-lighter with molded body. (Illustration courtesy Bakelite Corporation).

Use Siemon Parts

BRIDGEPORT, CONN.

The Siemon Company are exclusive moulders of Shellac compositions and compositions made from other natural gums. That other compounds are replacing this old material is a misconception as evidenced by the crowded condition of our Tool Room due to dies required for new work—articles which we have never made before. Automatic equipment, modern in every way, enables us to quote prices far below any other compound.

HOOSICK FALLS, NEW YORK

The Specialty Insulation Manufacturing Company are moulders of Colasta which is useable for all purposes and is a synthetic compound that is unequaled for moulding purposes particularly on account of its uniformity and its unusual physical characteristics. The Specialty plant with their own automatic presses made in their machine shop are especially equipped to quote interesting prices on volume moulding.

WATERTOWN, CONN.

The Watertown Manufacturing Company are manufacturers of both natural gum compositions and so-called phenolic synthetic compounds. They have a spacious modern plant making a large variety of moulded articles as used for the druggists—sundries, sporting goods, smoker's outfits, automobile, electrical users, and other branches of business too numerous to mention.

This plant has also absorbed the American Composition Company which was formerly located at Newark, New Jersey.

HOOSICK FALLS, NEW YORK

The Colasta Company inventors and manufacturers of the patented and perfected moulding compound of many characteristics is daily increasing its field of usefulness.

USE SIEMON PARTS

The Siemon Family

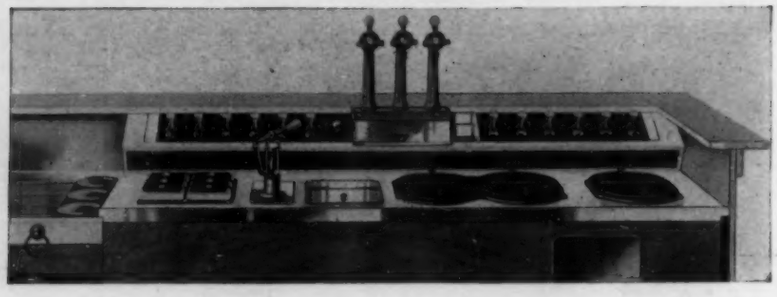
The Siemon Company
Bridgeport, Conn.

The Watertown Manufacturing Co.
Watertown, Conn.

The Colasta Company
Hoosick Falls, New York

The American Composition Co.
Watertown, Conn.

The Specialty Insulation Mfg. Co.
Hoosick Falls, New York



Molded fittings on a mechanically refrigerated fountain.

country are made of pyroxylin. The color range is endless. And the main point from the maker's standpoint there are more pens being sold. Beauty was the first consideration but there have also been compensations from a manufacturing standpoint as well.

Casein Uses

Casein has also been a big factor in helping the manufacturer and merchant increase their sales by the help of color. This plastic not only has found its way into such articles as rouge and lip stick boxes, and novelty jewelry. It is now in use in numberless house-hold articles such as table-ware handles, gas cock handles for the gas stove as well as handles for the oven doors. Handles for pots, pans, percolators and numbers of other uses.

Lamp Shades

It has recently been used in the manufacture of lamp shades. In delicate opalescent colors decorated with surface designs these lamp shades present a beautiful appearance. They also have the additional advantage of being far from as fragile as glass.

The phenolic resinoid group of plastics have contributed their share to the general trend not only in the color that they have brought to the articles made, but also in the ease with which they can be molded into intricate forms without additional machining. Where mass production will permit the use of this material through the fact

Odd type loud speaker molded from Bakelite.

that dies can be charged off, all sorts of intricate and beautiful articles can be turned out without any out-lay of additional labor.

Color Range

The average person has the idea that the phenolic resins can only be furnished in black or brown. However the present range of colors obtainable in this material will satisfy the most exacting tastes.

Added to the old group of phenolic compounds there is the new material known as Catalin which has only been on the market for about six months in this country. This is a phenolic base material that has a range of colors equal to any of the older plastics. This material instead of being furnished in powder form to the molder is made up in sheets, and rods. All the various colors are reproduced as well as the various mottles such as jade, horn, marble, quartz etc.

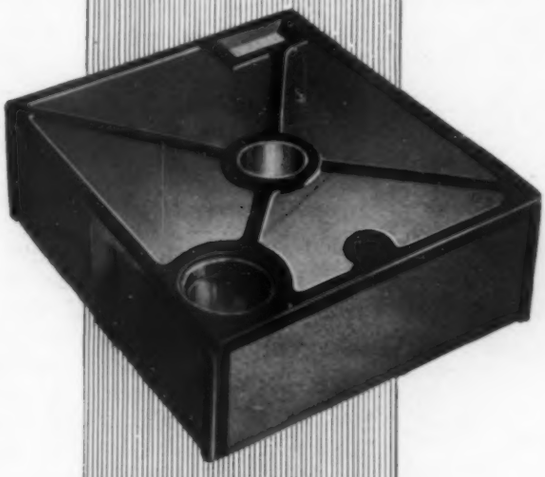
Each of the plastics group has its own appeal to the manufacturer in addition to its color range. It may be that the manufacturer will be more interested in a molding material that will come from the mold in its finished form without any addition labor for finishing. It may be that he will want to machine the article on his present equipment. No matter how the material is to be used there is some where in the field a material that will fill the demand for color with workability.

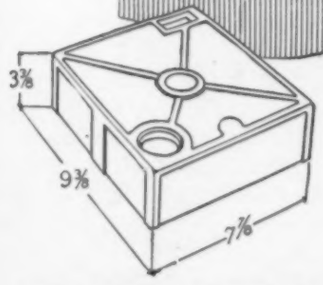
There is a product somewhere in the plastic family that will be of use to most of the manufacturers in dressing up their product for the market. And then starts the endless chain. A better looking product means more sales, more sales means more production, more production means lower overhead and costs, which reflects itself in the balance sheet at the end of the year.

Casein used in bright colors for cooking utensils handles.

PLASTIC MOLDING

Bakelite Motion Picture Camera Box, moulded by Shaw





IF YOUR JOB is one that requires expert craftsmanship, if your molded parts must be perfectly made and finished to the highest degree of accuracy, it will pay you to consult Shaw.

In other words, if your first consideration is to procure quality molding you need a quality molder.

Producers of the finest in moulded parts for thirty-five years.

SHAW INSULATOR CO.

IRVINGTON, NEW JERSEY

Established SHAW 1892

Reprint from Advertising & Selling, May 30, 1928 Issue

"$20,000 Industrial Plastic Ads Start 840 Manufacturers Thinking"

Some Universal Advertising Principles Are Discovered in the Contemporary Trade Press

FACTORIES are having to provide parking grounds for their workmen's cars. Department stores are building parking garages for the workmen's wives who are their customers.

Union wages are up 259.6 per cent since before the War. R. H. Macy has just reported the close to the biggest quarter in its history.

But stockholders are shaking their heads in bewilderment. Dividends are dividing instead of multiplying. Prosperity? Yes, says Wall Street; but a *profitless prosperity!*

What is to be done?

On one hand are high wages. On the other, low prices. Breathless, between them, are squeezed profits.

To relieve the pressure, one of two things is necessary:

1. Cut wages.
2. Lower costs.

Cut wages would disseminate the vast national market of wage earners. Inevitable, then, is the old problem, lower costs.

Every manufacturer today, subordinate to his own pocketbook or his stockholders', has that one thought ever present in mind; how to cut production costs.

Each ring of the telephone, each visitor's card, each newspaper or magazine article or advertisement is greeted with that insistent subconscious question: "Will this message help me cut my costs?"

The engineer is king, today.

He has accomplished wonders greater than the seven of ancient fame.

To these tremendous and fascinating problems of mass production, General Plastics, Inc., of North Tonawanda, New York, has applied itself. Capable engineers in the Tonawanda laboratories, near Buffalo, a very few years ago, developed a new chemical compound. Plastic in substance, it could be molded into an infinite variety of shapes and articles.

Durez, it was called, because, unlike the ordinary plastic, the finished article was ready after one single step, the molding. No hand or machine tooling was necessary; no burnishing, buffing, or finishing of any kind. This chemical composition was so clever that, upon extraction from the mold, the article appeared smooth, lustrous, appetizing to the most discriminating shopper. And the quality could be controlled to such a degree of uniformity that the millionth mold could be depended upon to duplicate the first!

Untold numbers of manufacturing operations could be dispensed with. Mass production was efficiently coupled with beauty, simplicity and uniformity. What a find for harassed production cost chisellers!

In analyzing their market, General Plastics, Inc., found that they could depend on less than 200 existing customers, concerns equipped to do hot press molding. And 75 per cent of these were only departments of large manufacturing concerns extensively engaged in the making of molded products.

Supplying the routine needs of these organizations was obviously a limited job for a small sales organization. The outstanding merits of Durez would

(*Continued to page 406*)

Scranton Parts

Parts like the above insulator must be perfect to the hundredth part of an inch.

Here is the largest plant of its kind, Scranton turns out millions of such parts in Phenolic, Bakelite or Lacanite. Each piece must pass a test of exact thoroughness before it can leave Scranton's plant.

The Scranton Button Co.

SCRANTON, PA.

Western Representative, Gordon D. Wilson
645 Washington Boul., Chicago, Ill.

New York Office, 50 Union Square
Arthur Wiseburn, Manager

Ohio Representative, J. E. Black & Co.
The 4900 Euclid Bldg., Cleveland, Ohio

One or a million without variation
E. R. SQUIBB & SONS, celebrated manufacturing chemists, are now using Durez caps on their tooth paste and shaving cream tubes. This great concern finds that Durez adds a note of distinction which is entirely in keeping with the Squibb methods of merchandising.
These caps cannot disorder the cream or paste. They fit absolutely air-tight—eliminating cork inserts. And—they are remarkably economical to manufacture.
Durez may be regarded as an outstanding achievement in the molding industry. It fuses and hardens with marvelous rapidity. Once molded, the part is complete. No costly tooling or burnishing. Best of all, the millionth part will be an exact duplicate of the first.
Durez has a high physical and a high dielectric strength. It resists heat, oil and dampness. With this remarkable plastic, you can give your products better wearing properties, better insulating properties and an all-round distinction which brings quicker consumer acceptance.
If you are faced by a peculiar molding problem, let us aid you in its solution. Our engineers and laboratories are at your service at all times. For complete information write to General Plastics, Incorporated, 21 Walck Road, North Tonawanda, New York. Also New York City, Hartford, Chicago, San Francisco.
DUREZ
Send for this interesting booklet
Our new booklet, "Do it with Durez," tells the complete story of this wonderful plastic. It shows how Durez is economically adapted to meet the most exacting needs. Profusely illustrated in full colors. Write for a copy today.
SQUIBB'S Dental Cream
SQUIBB'S SHAVING

hold a steady business here, if a limited one.

But why limit ourselves? asked General Plastics, Inc Production managers making every product under the sun are looking for new ways to lower costs and reassure their stockholders. Why couldn't the manufacturing efficiency of Durez be brought to save costs in other types of products where molding has heretofore been an unknown quantity?

With its ability to become a ready-to-sell product in one operation, molding without further finishing of any kind, Durez could well cut costs in the manufacture of door knobs, utensil handles, vanity cases, radio parts, cosmetic tube caps or—clock cases!

Which is what General Plastics, Inc., for one solid year told the industrial world through intelligent, informative trade paper advertising. The idea took. Squibb and Barbasol engaged molders to make caps for all their tubes, specifying Durez.

The New Haven Clock Company had commercial molders procure Durez and manufacture a new line of clock cases—so beautifully made in the one, economical molding operation that the line was named "Artlarm."

Other manufacturers investigated Durez, revised manufacturing processes to take advantage of the economies of this new substance.

Naturally, the second year's campaign wrote itself. It was in the nature of a testimonial series. Each advertisement dealt with some novel manufacturing use of Durez by some well known company.

Identical layouts were used in each advertisement. At the left was reproduced a photograph of the Durez-made product. For a headline was stated some novel, technical production fact, peculiar to the Durez process, suggesting in each case that here was an answer to the eternal problem of lowering production costs.

The copy began with a specific account of how some famous company was using Durez instead of older processes.

Two or three brief paragraphs described the most outstanding technical details of this new plastic compound; showed how expensive finishing processes could be entirely dispensed with; how millions of copies could be completed uniformly and with absolute simplicity.

A final sentence offered the services of the General Plastic engineers for perfecting more economical manufacturing methods for all types of products through the use of Durez.

To facilitate response, the specific offer of a pictured booklet was made in a box at the bottom of each advertisement.

An average of 60 to 75 booklet requests a month began to pour in after the appearance of each new advertisement in the series. About one in seven of these inquiries, it was found, was sufficiently "hot" to warrant the preparation of immediate estimates by molding contractors to whom these leads were referred.

ECONOMICS: Every manufacturer interested in reducing production costs.

MERCHANDISING: A new plastic compound capable of being manufactured into a finished article in a single step.

PSYCHOLOGY: Lower production costs.

RHETORIC: Headline suggests "psychological" appeal by specific statement of some technical detail of the "merchandising" angle. Copy reflects prestige, interest and believability through use of testimonal example. Text technical, specific, descriptive.

ART: Layout uniform in series. Beautifully reproduced photograph of product at left. Color-matching column of bold face type at right. Headline in lower case at top. Distinctive logotype at bottom. Large photograph of booklet and displayed paragraph describing it and offer, at bottom.

FACTS AND FIGURES

PRODUCT: *Plastic Compound*

SPACE: *Full page*

MEDIA: *Plastics & Moulded Products Magazine, Chemical and Metallurgical Engineering, Factory and Industrial Management, Electrical Record, Radio Engineering, Electrical Merchandising*

CIRCULATION: 90,157

COST: $20,000 annually

INQUIRIES: 840 annually (approximate)

AUTHOR: N. W. Ayer & Son

Why Not?

Under this head last month we ran a suggested use for pyroxylin plastic sheet stock. It is too early yet for us to learn whether this has proved to be of practical use or not.

Color is entering into everything in the merchandizing field. Even casket manufacturers have used pearl pyroxylin sheeting for decorating coffins.

One point at which we do not believe color has been featured enough up until the present, is in luggage. All sorts of leathers have been used, but colors seem to remain mostly either black or some shade of brown.

Possible Use

Why not a handle of one of the phenolic resinoid group of materials. This handle could be molded into a convenient shape to fit the hand and the color could be of some bright or contrasting shade.

There might be some objection on the score that the material lacks strength for this purpose. This could be obtained by a metal insert which could be used also to attach the handle to the bag.

We believe that the smooth feel of a molded handle would be a welcome relief to the more or less rough leather grips now in use.

In addition to the above, there has been shown lately in some of the smart shops, canes and umbrellas with handles of the same color to match. This idea could be carried through by the luggage shop in having cane, umbrella and traveling bag handles all match for color to make a set.

We would like to hear from the trade as to whether these suggestions are of value or not.

Kuhn & Jacob were chosen to mold the Rollmonica

Front View of Rollmonica

Rear View of Rollmonica

Here was a proposition requiring all the skill of a master builder of molds; all the dexterity of an expert in the art of thermo-plastic molding; coupled with an organization equipped to deliver intricate jobs in great quantities on a scheduled time basis.

KUHN & JACOB WERE CHOSEN TO MOLD THE ROLLMONICA.

KUHN & JACOB

MACHINE AND TOOL CO.

Trenton New Jersey

N. Y. office Arthur F. Jaeger 331 Madison Ave.

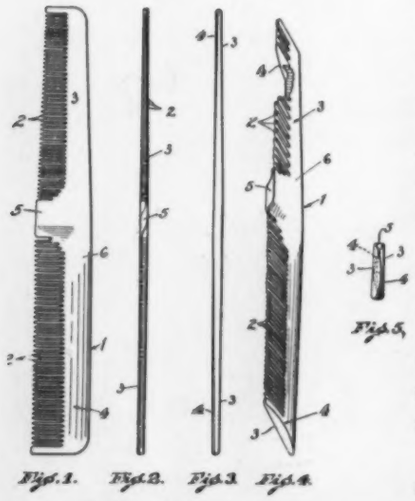
Some Recent Comb Patents

Details regarding these patents were derived from patent office records

THE homely articles of everyday life still seem to appeal to the genius of the inventor. The patent office is no longer flooded with the numbers of patents on non-refillable bottles as in former years for obvious reasons, but there are some articles which we can always count on to find in the patent gazette. Among these are countless varieties of combs. Some of these patents appear to have little if any value from a commercial standpoint, however the writer recalls a case where a comb patent remained unused for a number of years and when bobbed hair came in style paid the inventor quite a nice sum in royalties.

New Types

In recent issues of the patent gazette there were several types of combs covered which we are reviewing more to show the trend of the inventors' thoughts than for any practical value they may have at present.



G. W. Hydorn's Comb

Patent number 1,663,632 was issued to George W. Hydorn of Los Angeles, Cal., March 27th, 1928 covering a new type of barbers comb, shown in the illustration. The inventor calls attention to the fact that this comb is designed so that it will give the maximum of efficiency when used by a barber in cutting hair.

Finger Rest

The comb is provided with a finger rest which will eliminate the heretofore objectionable features of the comb teeth irritating the forefinger of the barber when the comb is in use.

Another object is to so construct a comb for barbers' use to engage and cut the hair below the comb when used in connection with the comb for cutting hair, and still provide a comb that will not be cumbersome or hinder the barber in his work.

Other Objects

Another object is to provide a comb for barbers use whereby the barber will be enabled to easily roll the comb in tapering the hair without hinderance or interference with the shears that the shears will not be likely when used in conjunction with the comb.

Other objects, advantages and features of the invention may appear from the accompanying sketch. This sketch illustrates the invention in only one style that the inventor at present deems preferable.

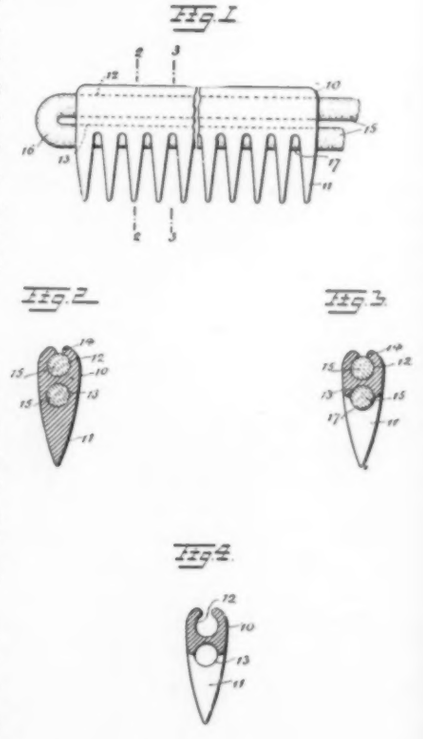
Figure 1 is a side view of the comb constructed in accordance with the invention.

Figure 2 is a top view of the comb shown in Fig. 1, and as viewed from the left hand side of Fig. 1.

Figure 3 is a bottom edge view of the comb as viewed from the right hand side of Fig. 1.

Figure 4 is a perspective view of a comb constructed in accordance with the invention. Parts are broken away to more clearly illustrate the construction.

Figure 5 is an end view of the comb looking from the lower end of Fig. 4.



Hutching's Patent

Another comb invention as shown in the second diagram is the one on which patent was is-

sued to H. H. Hutchings of New York City patent No. 1,665,134.

This invention relates to a comb that will provide a means for the drying of hair by absorbing moisture in the hair when combed and adapted also to apply oil or hair tonic to the hair.

Details

The nature of the invention and its advantages will appear as the description proceeds. Referring to the sketch shown which is illustrative of one example of the invention.

Figure 1 is a side elevation of a comb with the invention embodied therein.

Figure 2 is a cross section on the line 2-2 or Figure 1.

Figure 3 is a cross section on line 3-3 of Figure 1.

Figure 4 is a section similar to Figure 3 but omitting the absorbent element.

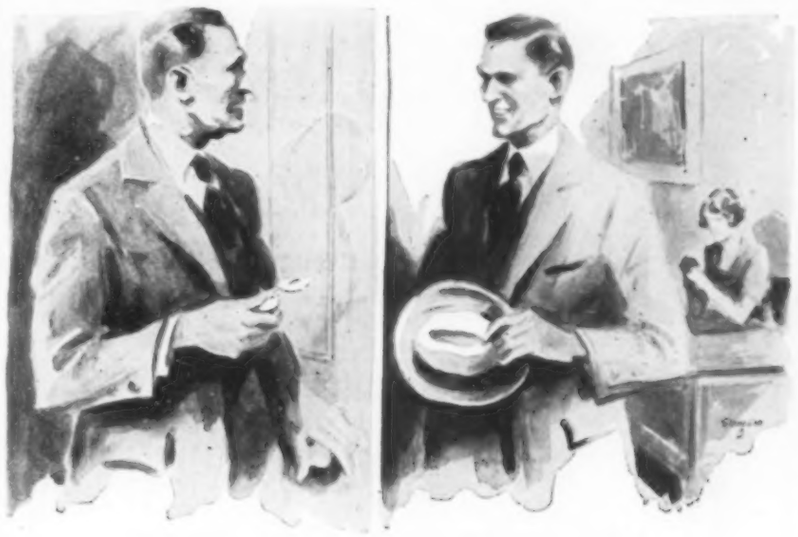
In carrying this invention into practice, the comb is formed with a back 10 and with teeth 11. In the back 10 is a longitudinal passage 12 to accomodate the running of an absorbent cord 15. The comb is further formed with a second longitudinal passage 13 adjacent the bases of the teeth.

The passage 12 is produced in practice by forming a longitudinal groove in the back 10 and then after the placing of a run of absorbent cord 15, bending over the material of the groove, as clearly shown in Fig- back 10 at the sides of the ures 2 to 4.

(*Continued to page 411*)

An Addition to the Rollmonica Story

In our June issue we ran a story of the molding job being done on the new player type of harmonica, known as the Rollmonica. We failed to mention in this story the name of the molder who was doing the molding of this rather interesting piece of work. This job is being molded of Bakelite by the Kuhn & Jacob Machine and Tool Co., of Trenton, N. J.



WANTED

Opportunity to Demonstrate *Cold Molded* Facts to *Open-Minded* Manufacturers

If this advertisement opens a few doors for our engineers—we are satisfied. The men at the head of this organization have been pioneers in the molded products industry. They know the multitude of claims which this industry has made and is making now. They know that cost and cold facts are all that can or should sell any molded product to you.

Only the overwhelming evidence that CETEC cuts costs and improves products leads us to ask an opportunity to demonstrate.

CETEC *is now available in* COLOR

CETEC—the cold molded material which is heat-proof and shock-proof—is now available in a wealth of beautiful colors and mottled effects. These colors are not surface colors only. They are part of the everlasting substance itself. They cannot peel, crack, stain or burn off.

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MOLDED PRODUCTS CORPORATION

MERIDEN, CONN.

Pyroxylin Sheeting for Airplane Windows

IT is still a moot point whether the present plethora of flying exploits has more than an ephemeral significance for the progress of aviation. The fact remains, however that commercial flying is in the ascendant. Indeed, it has been stated that airplane manufacturers now outnumber automobile makers.

One of the problems that have confronted airplane designers in the past has been the use of a suitable material for windows and wind screens. Such windows must be transparent, resistant to vibration, shock and driving rain and sleet, and must not cloud over easily.

It must have sufficient rigidity to withstand the air pressure developed during steep climbing and descent. Another very desirable property would be non-inflammability for safety.

Apparently safety glass of the triplex type—two sheets of glass with an intermediate film of celluloid or cellulose acetate—is not practicable. One reason for this is the too great readiness with which this material clouds over. Another reason this material is not used is that it cannot be bent into curved surfaces.

General Use

Pyroxylin plastic sheeting is in general use for these purposes as it meets most of the requirements specified. Cases in point are the "Spirit of St. Louis" made famous by Colonel Lindbergh, and Commander Richard E. Byrd's "America". Pyralin sheets 60/1000 inch thick was used for both side and overhead panels on the former plane. This material as well as Amerith is now being used for commercial planes, while government air-mail craft have been using wind breaks made of sheeting for a number of years with good success.

European practice calls for the use of non-inflammable sheeting with cellulose acetate base, and there should be room for this type of material in this country due to its fire proof base. In this connection it is worthy of note that one of the transparent forms of casein solids is now being used experimentally by U. S. Navy aircraft authorities.

More About the British Industries Fair

IN our April 1928 issue we published an article on Molded Products at the British Industries Fair by A. C. Blackall, our London correspondent. This article covered the field in a very comprehensive manner in so far as the native British manufacturers were concerned with the exception of mentioning Bakelite Limited.

This concern is controlled by the parent organization Bakelite Corporation. They have two plants in England, the Damard Works at Birmingham and the Mouldensite Works, at Darley Dale.

It is unfortunate that our correspondent did not cover this feature of the British Industries Fair, as Bakelite Ltd., had two booths, one of which is shown in the illustration. These booths exhibited the company's materials and the uses to which they are being put in a very complete manner.

These products cover practically the same range as furnished by Bakelite Corp. in this country, viz., molding powders and laminated products.

Some Recent Comb Patents

The passage 12 is produced in practice by forming a longitudinal groove in the back 10 and then after the placing of a run of absorbent cord 15, bending over the material of the back 10 at the sides of the groove, as clearly shown in Figures 2 to 4.

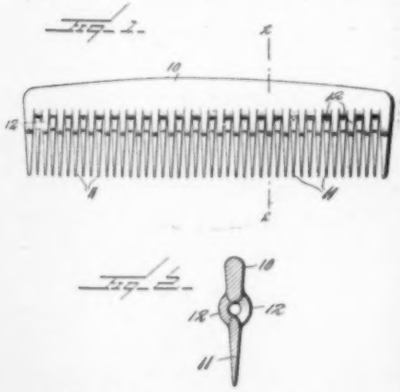
The passage 13 is formed by producing a groove partially in the back 10 and partially in the teeth 11, as best seen in Figures 3 and 4. The absorbent cord 15 is run through the passage 12 and bent on itself, as at 16, and returned through the passage 13. The location of the passage 13 is such that the front run of the cord 15 will be exposed between the teeth 11, as indicated at 17.

If a dry cord 15 is employed, it will be clear that when the comb is used on the hair after washing, the moisture in the hair at the bases of the teeth will be absorbed by the exposed area 17. The cord 15 is longitudinally moveable in both the passages 12 and 13. The exposed areas 17 may be renewed by a movement of the cord longitudinally of the comb.

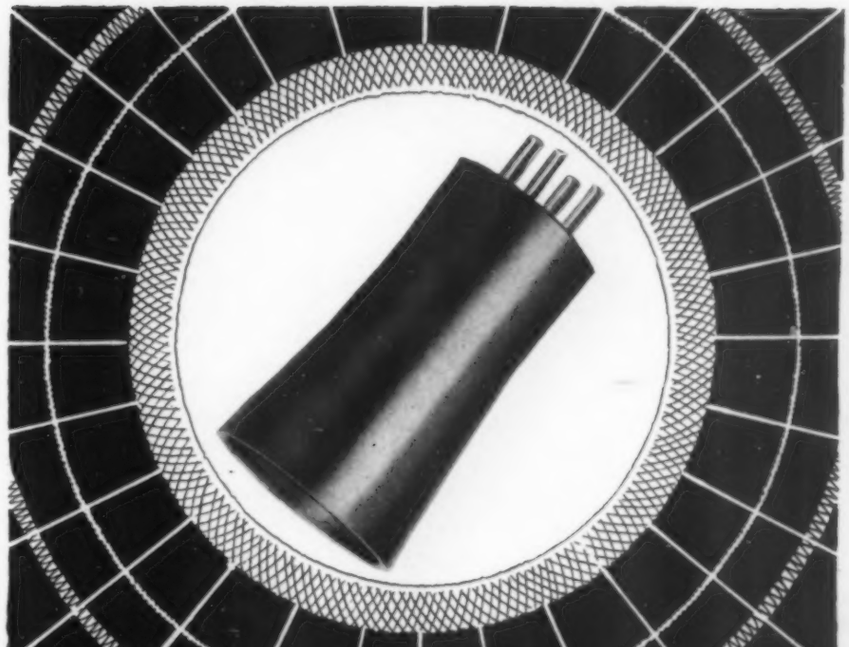
New Self Cleaner

The other invention relates to a self cleaning comb. This patent was issued to Gustav A. Meyer of Seward, Neb., patent No. 1,670,161.

In ordinary combs, the dirt, dandruff and the like are liable to gather at the intersection of the teeth with the base and clog up the slits between the comb



Gustav A. Meyer's Patent



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Mr. Ansel Cady, 289 Congress St., Boston, Mass.

G. S. Whitaker, Ltd., Toronto, Ont., Canada 8 Colborne St.,

White-Hanna Co., 302 Lincoln Bldg., Detroit, Mich.

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Boonton Molding Co.
324 Myrtle Avenue
Boonton, New Jersey

CUSTOM MOLDERS

teeth. This comb is so constructed as to avoid any tendency of the dirt and foreign matter to clog at this point.

Details

The invention is illustrated in the accompanying drawing, wherein:—

Figure 1 is an elevation of a comb constructed in accordance with this invention.

Figure 2 is a section on the line 2-2 of Figure 1.

Referring to this drawing, 10 designates the back of the comb, which may be made of any suitable material as for instance, celluloid, hard rubber, aluminum, or the like, and the strip of material from which the comb is formed is slotted to provide the teeth 11. The comb has the usual form except that each tooth at its base is bent outward in a curve, as at 12, and the alternate teeth are curved outward in reverse directions. Thus one tooth at its base is curved in one direction, the succeeding tooth is curved in the opposite direction, and so on. From these curved portions 12, the teeth extend down in the same plane, as shown in Figure 2.

Self Cleaning

With a comb of this character, dirt will not clog up at the intersection of the teeth with the back of the comb for the reason that plenty of space is left between the portions 12 through which the dirt, dandruff and the like may drop as at the bases of the teeth, the teeth are spread apart laterally in opposite directions so that any dirt passing upward between the teeth cannot clog between the two closely adjacent edge faces.

These patents present interesting ideas for the comb manufacturer to figure on, however they appear to present manufacturing difficulties which would prevent their being of commercial value.

Who Uses

(*Continued from page 396*)

large users of molded products. This condition was brought about by the demand of the public for the appearance of cleanliness about the fountain. For years the covers for the ice cream and syrup containers were made of metal. The metal covers were in constant need of polishing and it was almost impossible to keep them clean. This condition has all been changed by the use of covers molded from phenolic resin material. Because they are non-absorbent, such molded parts are equal to similar parts in sanitary qualities, while their permanent polish, elegant appearance, and resistance to attack by fruit acids, are points in their favor.

It would be possible to go on giving illustrations of the uses to which molded parts have been put and the reasons for their use but the above will serve to show to some small extent, some of the uses. The reasons why these materials were used are almost as varied as the uses to which they are put.

Colored Handles

(*Continued from page 398*)

parts is well known. It has a smooth finish that is not impaired with age. This finish is obtained in the mold and not by any additional labor. And last but not least is the peculiar heat insulating value of phenolic molded parts which keeps the handle of the iron cool no matter how hot the iron itself becomes.

Combined with all these natural advantages there is little to be wondered at that when it is also possible to cater to the public demand for color the manufacturer and merchandizer makes use of this material.

Electric Wall Plate Story in an Early Issue

Anything Molded of Bakelite

A few interesting small parts made by

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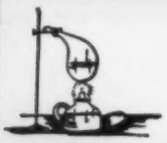

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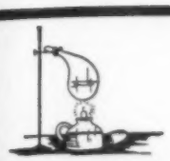

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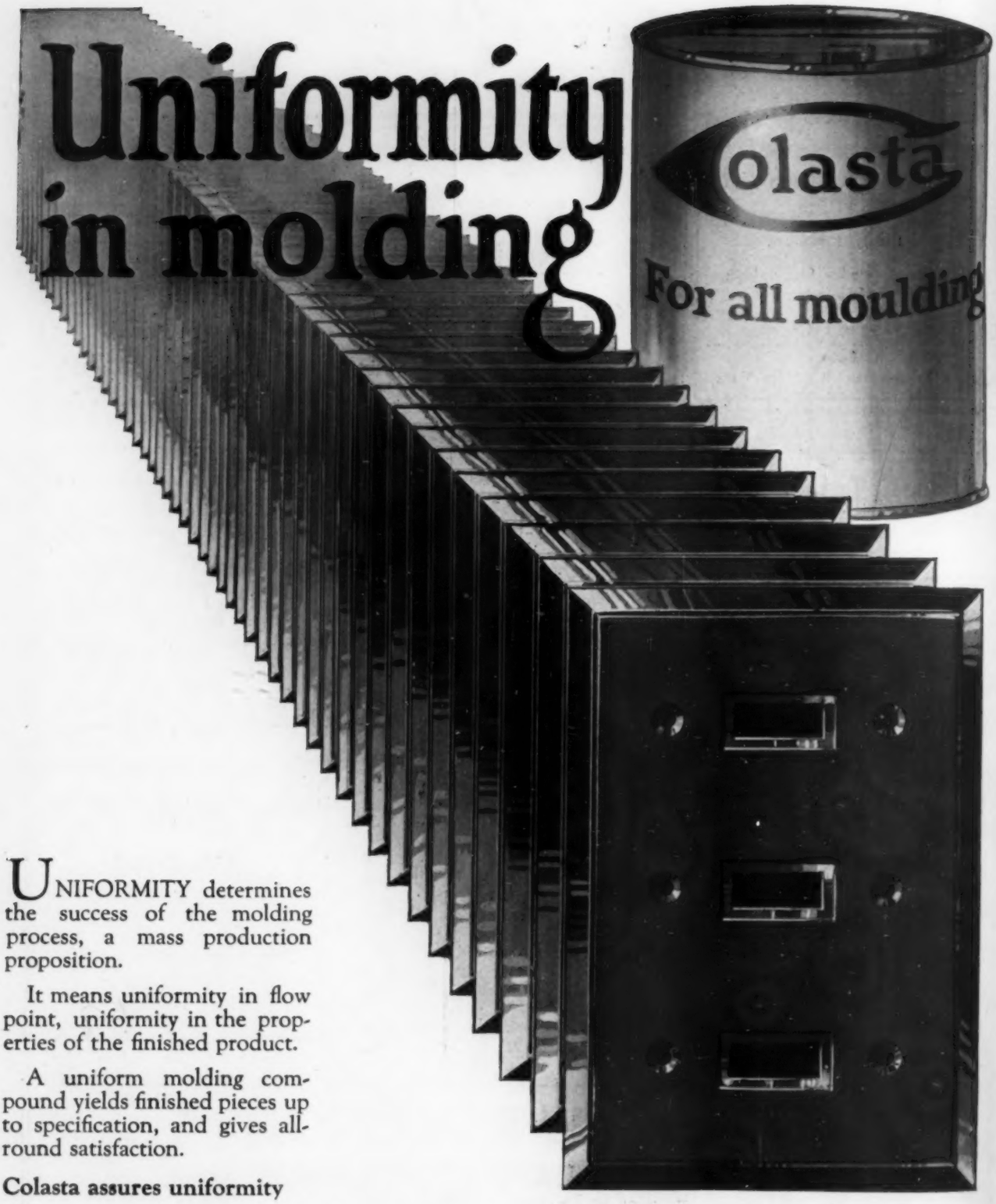

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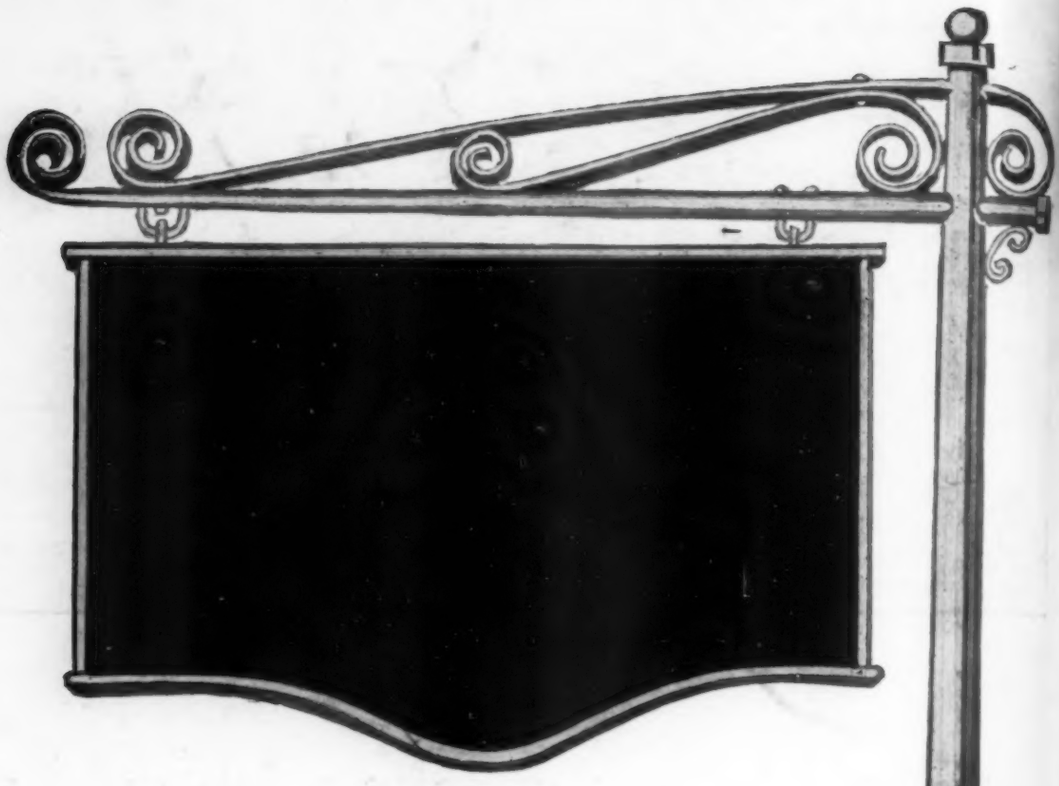

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